Picking Winners?
The Effect of Birth Order and Migration on Parental Human Capital Investments in Pre-Modern England[*]

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Abstract This paper uses linked apprenticeship-family reconstitution records to explore the influence of family structure on human capital formation in preindustrial England. We observe a small but significant relationship between birth order, resources and human capital investments. Among the gentry, eldest sons were almost never apprenticed. Outside the gentry, a large number of apprentices were eldest sons, even from farming families. This Implies a relatively large place for a child's aptitude and interest in shaping their career compared to custom or inheritance practices, making the "middling sorts" behave much more as families do in present-day labour studies than the contemporary elites. We also find a surprisingly high rate of return migration, questioning the emphasis on neo-locality and suggesting that parents could anticipate benefiting directly from positive externalities arising from the training provided to children. This interpretation also fits well with our finding that if parents had died before indenture, apprentices were significantly less likely to return home.

Keywords Apprenticeship, Family Structure, Human Capital, Preindustrial England, Primogeniture

Introduction

How did families in pre-modern Europe structure their investments in the education and skills of their children? The dynamics of human capital formation prior to industrialisation, particularly the so-called quantity-quality trade-off, have a central role in endogenous growth theories in which the parents' investments in their children help generate the emergence of sustained economic growth (Galor and Weil 1999; Klemp and Weisdorf 2012). These analyses build on one of the key predictions of Becker's household economics: an inverse relationship between family size and investment in the human capital of children (Becker 1960; Becker and Lewis 1973; Becker and Tomes 1979; Becker and Tomes 1994). Empirical studies of this prediction using modern data generate mixed results: some find that children in smaller families receive greater parental investments, while others report that large differences between earlier and later-born children are of greater significance (Hanuschek 1992; Black, Devereux, and Salvanes 1995; Kessler 1991; Behrman and Taubman 1986). Recent studies suggest that smaller family size led to greater investment in human capital formation in both pre-industrial England and elsewhere (Becker et al. 2011; Fernihough 2011; Klemp and Weisdorf 2012). Little is known about the distribution of investments in human capital between children, however.

Yet for pre-industrial families contemplating investing in the skills of their children, the question was about much more that simply how much to invest in their children. Given the large private costs associated with education and training, an important consideration was *which* child would receive the investment. Families' answers to this question have broad implications for the efficiency of human capital investments in this period. If human capital investment was dictated by seniority, whereby older siblings inherit the land while younger siblings receive education, then we would expect poorer long-term outcomes than if investment decisions were allocated by aptitude and interest.[1]

Families would also want to take into account the effect of providing training on the long-term economic relationship they would have with their children. Departure from the family home for a period of service or training could mean permanent departure from the family's economic sphere, increasing the risk of 'nuclear hardship' for parents as they aged (Bouman et al. 2012; Laslett 1988). As Wall (1978) documented, the majority of children in early modern England above the age of 15 had left their parental home. The decade between departure and marriage was a key stage in the economic development of youths. Residence in another household, as a servant or apprentice, provided experience, training, savings, and for some the potential to develop professional and commercial networks (Ben-Amos 1988; Kussmaul 1981; Wallis 2008; Minns and Wallis 2012). It also plays a leading part in explaining the European Marriage Pattern (Hanjal 1965; 1982; de Moor and van Zanden 2010). Youths who left well-off households to train, marry, and establish new households may even have carried the seeds of economic growth themselves, through the values and patterns of behaviour transmitted from middle-class and upper-class parents (Clark 2006).

Given the potential importance of how families allocated opportunities between children, it is surprising how little is known about the process in historical settings.

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[1] Whether the sort of "customary" behaviour we describe was actually a common custom in early modern societies is of course the subject of some debate; see Thompson (1991) on the flexibility of early modern customary practice.

Differences in the way families raised male and female children leave no doubt that all children were not treated equally. Female literacy was uniformly lower than male literacy, while at most one in twenty apprentices was female (Burnette 2008). For male children, inheritance customs often differentiated between eldest and younger sons, implying that other investments might also differ. Yet while scholars of early modern Europe have extensively debated the extent, process and economic and social effects of primogeniture (Goody, Thirsk, and Thompson 1976; Birdwell-Pheasant 1998; Landes 2003; Sabean and Teuscher 2007; Bonfield 2010), much less has been written on whether birth order was an important determinant of how opportunities other than the inheritance of agricultural land and office were determined, how it affected social reproduction outside the elite, and its relative importance outside rural society (although see Johnson and Sabean 2011). Similarly, the literature on adolescent service generally takes youths as a relatively homogenous group, distinguished by resources and status, but not by birth parity, and says little about how short term family dynamics affected youths' prospects.[2]

Among the English landed elite, it is clear that birth order strongly affected educational opportunities (Thirsk 1969; Pollock 1989; Wallis and Webb 2011). For eldest gentry sons, university and legal training dominate. Few were apprenticed. The share of second-born sons apprenticed is more than double that of eldest sons, and nearly doubles again among sons born fourth or higher (Figure 1, see Wallis and Webb 2011 for more details on this database). However, this evidence provides only a limited window into how departure and economic investments were related to the structure and characteristics of the household, and tells us nothing about practices in other sections of society. Primogeniture was not, after all, universally adopted in England, and even when it was, the devolution of resources between generations often provided substantial provision for non-heirs. Urban inheritance was often partible. The custom of London, for example, required a third of the estate to be divided equally between sons and daughters, leaving a third to the discretion of the testator (Grassby 2001:343). Studies of the English urban middle class and rural non-elite groups suggest that in wills equal treatment of children was common, in contrast to the testaments of the gentry (Earle 1989; Cooper 1992; Grassby 2001; Johnston 1995). Among relatively elite professions, elder and younger sons appear in roughly equal numbers (Brooks 1986: 245). Direct studies of intergenerational investments tend, however, to be limited in scale. Howell's exploration of rural inheritance patterns under primogeniture concentrates on a single community, Kibworth (Howell 1976). Field's exploration of London apprentices from North East England found a large proportion of first sons, but was limited to a sample of 87 (Field 2010: 8). Horwitz's suggestion that younger sons of London's 'big' business families tended to follow the same path as their elder brothers is based on seventeen individuals (Horwitz 1987). Cooper's conclusion that parents sought 'for the most part' 'to give their children equality of opportunity' derives from 97 wills from late seventeenth century King's Lynn (Cooper 1992: 296).

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[2] One partial exception is Dribe (2003), where birth position and mortality shocks are connected to the decision to migrate. In a subsequent article, Dribe and Lundh (2005) assess the determinants of servant migration in 19th century Sweden, but have less information on family characteristics, and in particular on the impact of birth parity and shocks in the family on migration propensities.

This paper combines apprenticeship records with information from a range of parish reconstitutions covering rural and metropolitan areas to explore family decision making over one of the most important human capital investments available prior to the emergence of mass education. An apprenticeship was a major outlet for families seeking to invest in the human capital of their children in pre-modern societies. It was an expensive choice, in terms of opportunity costs and, often, direct payments in the form of training premiums. We focus on two key interactions: how families chose to direct investments in apprenticeship between their children and how this decision was linked to household conditions; and the implications of these investments for permanent migration away from the home parish. The first allows us to contrast the role of custom versus economic incentives in human capital investment decisions. The second provides a window into the extent to which departure from the household economy was typically "permanent", if, as seems likely, those we observe returning to their home parish to form a new household kept closer economic ties with parents and extended family than those who remained away.

Our findings show that apprenticeship decisions in early modern England largely reflected economic circumstances in the family. A birth order effect was present, but was not large. Apprenticeships were fairly evenly distributed among children of households that did not possess indivisible capital and assets, but were more biased towards 'junior' children among those families with land. Families of the "middling sort" that supplied apprentices acted quite differently to the English elite, and in a way that is more often associated with economically efficient outcomes, a finding that calls into question recent arguments regarding the diffusion of elite values in fostering economic growth (Clark 2006).[3] Evidence of ongoing contact between apprentices and their home parishes suggest that the motivation to pay for an indenture could plausibly include the benefits of long-term economic relationships with more skilled children, and indicate that high rates of migration did not necessarily imply permanent departure.

Opening the black box: linking apprenticeship and migration to parish reconstitutions

To generate new evidence on household decision-making, we linked household records from seventeenth and eighteenth-century parish reconstitutions to two sets of apprenticeship records. The sample of apprentices and children identified is the first substantial group of non-elite youths in early modern England for whom it is possible to explore the relationship between household conditions and decisions about leaving home and entering training.

Figure 2 displays the location of the reconstituted parishes. The first group includes fifteen of twenty-six provincial parishes reconstituted by the Cambridge Group (Wrigley 1997). These parishes range from market towns, such as Banbury and Reigate, to parishes that were almost entirely agricultural. The second group of reconstitutions includes eight London parishes: five small central parishes in Cheapside, All Hallows Honey Lane, St Mary le Bow, St Pancras Soper Lane, St Mary Colechurch and St Martin Ironmonger Lane, two larger parishes in the growing suburbs north of the city in Clerkenwell, St James Clerkenwell

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[3] We use the term "middling sort" to describe a broad group of middle income/middle class English families: see French (2007) for a detailed review of how historians have characterised this group.

and St John Clerkenwell, and one large parish on the eastern edge of the city, St Botolph Aldgate. These have been assembled recently as part of the People and Place project.[4] The reconstitutions included 105,389 children from the provincial parishes and 33,854 children from the London parishes who were born between 1600 and 1800 for whom their forename, and their father's forename and surname were given, and who were not recorded as dying before the age of 12.[5]

Our evidence of apprenticeship is drawn from two sources. The first is a sample of London Livery Company registers records of just over 300,000 apprentices who were indentured (i.e. contracted) between 1600 and 1800 (Webb 1996-2005). It covers eighty-one Companies for some or all of this period, comprising between a half and two-thirds of all London apprentices. The second sample consists of around 330,000 apprentices who paid premiums (fees paid by apprentices to masters on binding) that were assessed for Stamp Tax between 1711 and 1774. This source provides evidence on apprenticeship nationwide. However, it omits the many apprentices who did not pay a premium (Minns and Wallis 2011). The quality and completeness of the records in each source varies. In particular, a large and rising proportion of Stamp Tax records lack details on the place of origin of apprentices, hindering linkage.

We were able to link 1,375 parish-born children with an apprentice indenture record. To achieve this, we utilised four linkage strategies, each of different strength. All include a nominal component, with apprentices paired with children from these parishes where we were able to match the child and their father's names within a plausible time period. First, in most cases (1,030) we combined nominal linkage with a match between the parish and the place of origin of the apprentice given in the indenture.[6] Second, for a small group (121), we combined nominal linkage with a match between the occupations of apprentices and children's fathers; this was only used to link London apprentices for whom no parish of origin was recorded with children from London parish reconstitutions.[7] Third, for 206 apprentices, we identified a strong match by name, place *and* occupation. Finally, where the Stamp Tax listed apprentices bound to masters who lived in the provincial reconstitution parishes, but included no information about the apprentices' place of origin, we assumed that there was a high likelihood that these masters were binding local boys. This allowed us to link 18 apprentices bound locally with children in the parish.

Because our main concern was to avoid 'false positives' in the linkage, we applied a set of restrictive rules to the linkage. We matched genders. We only accepted links for children with an implied age when indentured of between 12 and 30 years.[8] We excluded duplicate observations where more than one child could be linked to an apprentice, and vice

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[4] We thank Gill Newton for providing these records in electronic form.

[5] The London reconstitutions end in the 1750s.

[6] Place linkage is less precise for the London reconstitutions than those outside because apprentices are often identified as coming from a street or area of the city, not a specific parish. We only link apprentices identified with places co-located with the London parishes. For example, for Clerkenwell, of 532 linkages, 332 specified a parish name, 27 specified streets within the parish (Clerkenwell Green; Red Lion Street; St John Street, Woods Close; Goswell Street; and Albermarle Street), and 173 specified the area 'Clerkenwell'.

[7] For 109 of the 121 apprentices we have supplementary evidence that they came from the city: 28 were described as coming from 'London'; 90 were the sons of London citizens.

[8] The average age of indenture for seventeenth and eighteenth century apprentices ranged between 16 and 18 years (Wallis, Webb, and Minns, 2011).

versa, although this will exclude some cases where apprentices were re-indentured.[9] One effect of this was to exclude all links to 'same name' children in a single family, unless the death of one is recorded. All nominal linkages used names converted into phonetic strings using the Double Metaphone algorithm. This increased the pool of potential links, by reducing the impact of variant spellings, but also increased the number of excluded duplicate identifications. Finally, we hand-checked the linked sample to check the validity of the sample generated by our name algorithm.

Table 1 measures the success of our linkage, giving the share of apprentices reportedly from one of the reconstituted parishes that we were able to link to a child in the family reconstitutions. We linked about 20 percent of Livery Company apprentices, and about 25 percent of Stamp Tax apprentices. Most of these apprentices trained in London, as only 120 of the 258 linked Stamp Tax apprentices were trained elsewhere. The slightly higher match rates we achieved for apprentices from provincial parishes is probably due to the greater ambiguity in indentures over the place of origin of apprentices from London; for example, not all those described as coming from 'Clerkenwell' would have had births registered in the parishes that have been reconstituted. Figure 3 plots the temporal distribution of linked observations. These are concentrated in the first half of the eighteenth century, when parish reconstitutions are most abundant and the number of youths entering apprenticeships in London reached its peak. As a result, we rarely have a long run of a large number of observations within a single parish with which we could evaluate the effect of local shocks on apprenticeship decisions.

The information we possess about the youths in our sample varies somewhat. For apprentices enrolled with London's Livery Companies, the records provide us with information about the master's guild (which may be different to his occupation), and usually the occupation of the apprentice's father. The Stamp Tax offers more detail on the occupation of the master (for those outside London), the value of the premium, and, sometimes, the occupation of the apprentice's father; parental occupation is often missing in the Stamp Tax Registers. The family reconstitutions provide a wealth of detail about the family from which the apprentice came. Births that occur in the parish are recorded, from which we can compute birth order and sibship size. We also know about deaths in the parish, with which we can correct birth order and sibship size for sibling mortality, and observe paternal and maternal mortality.

Studies of the socioeconomic background of youths placed in pre-modern craft apprenticeship typically show that that these were mainly the sons of the middling sorts (Earle 1989; Leunig, Minns and Wallis, 2011). This broad characterization appears to hold up well for the sample we have created. Nearly all the apprentices we linked were male. Provincial apprentices predominantly had fathers in the primary sector (i.e. agriculture) and manufacturing occupations, with some sons of merchants and traders (distribution and sales) and a smattering of gentry children also present (Table 2). A few managed to secure an apprenticeship from the lower rungs of society, such as labourers' sons. Fewer apprentices with primary sector or gentlemen fathers are in evidence in London, where the intake was dominated by the sons of tradesmen whose clustering in 'manufacturing' may reflect their

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[9] To limit the chance of false positives, when checking for duplicates we used a pool of links aged 9 to 30 when indentured.

Livery Company affiliation more than their actual trade. For apprentices linked to the Stamp Tax records, we know that their premiums, usually of around 15 to 20 pounds, were in line with those paid by larger samples of apprentices (Minns and Wallis 2011). On these observable characteristics, the apprentices we linked appear to be fairly representative of the apprentice population as a whole.

We have no benchmark for apprentices' family characteristics, but there are some striking features. Many were the eldest surviving sons in their family – in London, two-thirds of apprentices had this position, but even a third of provincial apprentices were eldest sons. The number of surviving male children in an apprentices' family (measured here by survival to age 5) differs markedly between the two groups. London families were small, with fewer than two surviving sons on average. In the provinces, almost twice as many sons survived. Record linkage may be artificially lowering the number of sons in London, but demographic pressures were much harsher in the city (Landers 1993).

Aside from the uncertainties associated with any linkage between different sets of records, our approach comes with some important limitations that need to be noted. First, in principle, the reconstitutions describe the structure of all resident families, and supply a history of demographic events within the family so long as these take place in the parish of observation. In practice, migration, as well as limits in the comprehensiveness of the original records, mean that the amount of evidence available for each individual child and family varies greatly.[10] Indeed one of the interests of this exercise is that it explores one of the more significant migratory processes for a reconstituted population. Vital events that occurred outside the parish and departures from the parish (other than through a local death) are not recorded. This may cause us to underestimate family and sibship size if children had been born outside the parish, and to overestimate the number of surviving siblings competing for family resources if some died outside the parish. Both types of error will affect our assignment of a birth order position to children.[11]

Second, apprenticeship, and in particular formal guild-regulated apprenticeship, was only one avenue through which youths could acquire skills in this period. Our sources do not tell us about placements in agricultural or domestic service, informal apprenticeships, or training within the parental family.[12] Nor, obviously, do they tell us anything about apprenticeships in London Livery Companies outside our sample or about provincial apprenticeships for which no premium was paid (or, more precisely, no tax was paid on the premium). The likely effect is to bias our sample to those able to obtain 'high quality' opportunities, as masters who did not charge premiums were generally in lower-income trades, and training in London was relatively costly but sufficiently attractive to draw in a

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[10] Wrigley et al. 1997

[11] The first type of error can be addressed to some extent by restricting the sample to 'completed' families where the marriage is observed in the parish and the mother is still observed in the parish after her reproductive period ends. Estimates of the share of first-born apprentices with mothers who were born and buried in the parish of origin are extremely close to that found in the full regression sample. No secure correction method exists for the second type of error (Wrigley et al. 1997).

[12] The exception to training within the family is when fathers registered their sons with their guild. Twenty nine of our linked apprentices from the Livery Company records were bound by their father. No provincial fathers training sons are recorded, because such arrangements are unlikely to appear in the Stamp Tax records, as fathers don't charge a premium to themselves.

uniquely broad pool of youths.[13] Nevertheless, understanding entrance into established, fee-paying craft apprenticeships was of interest to contemporaries at the time (Defoe 1726, Campbell 1747) and remains central to studies of early modern training today.

Third, while we are able to link a reasonable share of those Stamp Tax and Company apprentices who are known to have come from these parishes to their roots, our sample includes just under 0.7 percent of male children in provincial parishes and 3.8 percent of male children in London. The handful of female apprentices we identify account for a trivial share of female children.[14]

These limitations affect the type of questions that we can usefully address. Any attempt to explain why some children were apprenticed and others were not in a population where (a) the proportion of children we observe as apprentices is so small and (b) so many children who were apprenticed are not identified, is unlikely to yield sensible econometric results.[15] As with most studies of apprenticeship, we thus cannot say anything about how those who ended up in apprenticeship were selected from the broader pool of youths in their town or parish of origin. For this reason, we treat our linked group of apprentices as a random sample of children entering these kinds of apprenticeships, and concentrate mainly on the allocation of apprenticeship places among children *within* households where we observe at least one child being apprenticed. The question that we pursue here is how families that did have the resources necessary to finance an indenture decided *which* child to place in apprenticeship.

Which children became apprentices?

In deciding how to allocate opportunities between children, families are likely to be influenced by custom, economic constraints, aptitude and the impact of demographic events, such as the death of a parent or a sibling. In particular, as the division of family property following the death of the father or mother was shaped by formal and informal legal and social expectations, earlier decisions about the education and migration of children would anticipate and foreshadow later inequalities. Where the inheritance system favoured primogeniture, families with large portfolios of relatively illiquid resources, most notably land holdings in agriculture, would transmit these to the eldest surviving son. Under northern European expectations that extended families would rarely cohabit, children further down the birth order would need to find a separate way to support themselves. As the evidence for English gentry families demonstrates, younger children would therefore be more likely to be placed in an apprenticeship that would provide them with entry into a different occupation and, often, a new location -- always, of course, subject to the family having the resources necessary to finance an apprenticeship premium and to forgo the potential income of these children.

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[13]Minns and Wallis 2012; Leunig, Minns and Wallis 2011.

[14] Approximately 72,823 male and 71,451 female children were born who are not known to have died before age 12 in the provincial reconstitutions; they are identified with 80,703 'families'. For Cheapside and Clerkenwell the figures are 14,695 male, 14,933 female children, and 26,003 'families'. Many 'families' are identified through the record of a single child's baptism.

[15] See King and Zeng (2001) on the challenges associated with the estimation of binary models with rare outcomes.

However, one might also expect decisions regarding whether or not to apprentice a child to represent a rational response to the economic circumstances facing the family. If maximizing intergenerational wealth accumulation was an important consideration, the aptitude of children for a trade should play a prominent role in deciding which child to place in an apprenticeship. Families might want to "pick winners" in this way, but they would also be constrained by the prospect of parent mortality, child mortality, and uncertainty over ultimate family size. All else being equal, aptitude should lead to a random distribution of apprenticeships (i.e. no particularly birth orders are favoured over others), although uncertainty may favour devoting resources to earlier children.

To evaluate the presence of a birth order effect on non-elite family investments we compare the chance allocation of apprenticeships by birth order to the allocation observed in our sample. Suppose that families select one son for apprenticeship, that aptitude for apprenticeship is independent of birth order, and that parents selected the son they thought had the greatest aptitude for training. Given these conditions, we would expect that the share of apprentices who were eldest sons would be no different to the share of all sons who were eldest sons. Families with two sons should put half of eldest sons into apprenticeships, those with three sons should put a third and so on. In general, if the share of apprentices who are eldest sons diverges significantly from share predicted by the inverse of the number of surviving male children, then we have prima facie evidence of families differentiating between boys by birth order.

Figures 4 to 6 report the results of this comparison.[16] In provincial England, birth position did matter. Apprentices were less likely to be eldest sons than we would expect if apprenticeships were distributed randomly or by aptitude in all families with more than one surviving son (Figure 4). This tendency is much more pronounced in those whose families were working in primary sector occupations (Figure 5): in farming families with four surviving sons, for example, only 5% of apprentices were eldest sons, compared to the 25% we would expect if aptitude determined the decision. In London, the share of apprentices who were eldest sons is much closer to share predicted by the size of their family, and few of the differences by birth parity are statistically significant (Figure 6).

The tendency for apprenticeships to be used for sons who were positioned further down the birth order varied according to the economic background of their parents. There are clear occupational differences in the percentage of eldest sons who were apprenticed by parent occupation group. In provincial parishes, families in the primary sector or distribution and sales were the least likely to put their eldest sons into apprenticeships, while families in the service sector or labourers were much more likely to apprentice their eldest sons (Figure 7). These differences may in part reflect unobserved differences in family size within each group, as richer parents typically had more surviving male children (Clark and Hamilton 2006; Boberg-Fazlic, Sharp, and Weisdorf, 2011). The eldest sons of servants are clearly over-represented, however, while the opposite is true for the eldest sons of merchants and traders in distribution and sales. A similar pattern is evident in London (Figure 8). In the metropolis we also find substantial differences in the share of apprentices who were eldest

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[16] Appendix Table A1 shows the underlying data.

sons, despite a smaller range of surviving male sons between occupation groups.[17] On average, eldest sons were less likely to be appreticed where there were other siblings to consider, but those families with limited resources, such as labourers, who were able to acquire a training place do appear more likely to have directed opportunities towards older sons.[18]

Regression analysis allows us to undertake a more fine-grained examination of the effects of birth parity. For samples of all male children surviving to age 5 in both the provincial and London linkage sets, we have estimated linear probability regressions of the determinants of which child or children in each family received an apprenticeship.[19] These results confirm the visual evidence from the previous sets of figures. In the provinces (Table 3), eldest sons are significantly under-represented relative to later sons, a pattern that is robust to the inclusion of controls for occupation (model 2) and female sibship size. For London (Table 4), the eldest son effect is much closer to zero. In both samples, models 3 and 4 in the regressions explore patterns of apprenticeship by parent occupation. We find parents in the primary sector (farming) diverting training opportunities to younger sons to a greater degree than other groups in the provinces, and those from the distribution and sales sector doing the same in London. In other sectors, and especially in London, the data suggest that parents were less influenced by the birth order, with eldest boys treated in a similar way to their younger brothers. Birth order biases appear to have been strongly conditioned by the nature and divisibility of family resources, and were significantly weaker in urban than rural contexts, suggesting a further dynamic relationship between urbanisation and development.

Returning to the parish: marriage and death

Many apprenticeships involved long-distance migration, often to London. The traditional literature on apprenticeship emphasizes that this was a first step to corporate citizenship; successful apprentices would therefore have little reason to return to their original place of residence after training (Rappaport 1988). It is also well-known, however, that between a third and a half of apprentices did not complete their term of apprenticeship, and that fewer than half of apprentices settled to become citizens or freemen of the place in which they trained after their training (Ben-Amos 1991; Wallis 2008; Minns and Wallis 2012; Humphries 2010).

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[17] Figure 7 and 8 are constructed for families with at least two surviving male sons. This eliminates the mechanical bias resulting from the inclusion of single-son families where the eldest son must be the one who was indentured. There are a lot more single surviving son families in London, which we suspect reflects both fertility and mortality conditions, and movement into the parish where only local births are properly recorded. If single sons are included in the calculations underlying Figures 7 and 8, the eldest son share rises sharply (especially for London), but the relative differences between parent occupation groups remain.

[18] These findings are limited to apprentices for whom a premium payment was recorded. If firstborn sons were more likely than younger siblings to enter into an indenture where a premium was paid, then our sample would be biased towards firstborn sons, relative to the total population of apprentices with and without premiums. While we do not have direct evidence to rule out this possibility, the fact that firstborn sons were *less* likely to receive (premium) apprenticeship training than sons lower in the birth order suggests that this outcome is unlikely, and the effect of any such (unobserved) error would be to increase the size of the bias, but not change its direction or relative strength between groups.

[19] We have also estimated probit regressions, which yield similar marginal effects.

Thus far, historians have only been able to speculate about what happened to those apprentices who disappeared from training and the corporate system. Colourful examples from criminal records can give the impression that non-completion could be equated to failure. However, it is also plausible that many apprentices entered their training with some anticipation of early departure. The patterns of apprentices' departures in late seventeenth century London and Bristol suggest that some had entered service to obtain training and connections that they could use if they returned home (Minns and Wallis 2012). Premiums paid by apprentices also appear to reflect the higher likelihood that some apprentices were likely to leave early, with apprentices from groups who were more likely to leave early paying higher fees to their masters (Minns and Wallis 2011). Actual evidence that youths engaged in apprenticeship as part of circular migration has been fragmentary at best, however.

Our linkage between apprenticeship lists and parish reconstitutions provides three types of evidence about the return of youths who had taken up apprenticeships: the marriage records of ex-apprentices, their burial in their parish of birth, and the establishment of a family within their parish of birth. The share of apprentices who were later recorded in any of these ways in their parish of birth is given in Table 5, along with the share observed in any of them. It should be noted that only the third category, establishing a family, offers truly strong evidence of continued residence or return. A marriage might precede a further migration, or simply be an apprentice returning to collect a bride. A death may record a youth who had returned home when sick, or an adult who had returned in retirement to their place of origin. At the least, marriage and death records indicate the persistence of strong connections with the community of origin, and some would reflect circular migration, as implied by having a family at home.

Let us take the weaker indicators first. How often did apprentices marry in their home parish? We find that fifteen percent of all apprentices wed in their parish of origin. Because we have a substantial number of apprentices who remained in their place of origin to train, we have a benchmark against which to compare marriage outcomes for those who left home to train. Among provincial apprentices, the home parish marriage rate was lower for apprentices who migrated for their training. Thirty percent of those training in their home community would wed there.[20] The home marriage rate fell to 16 percent among youths apprenticed elsewhere but outside London, and to 10 percent for those who migrated to London to enter apprenticeships. It is unsurprising that the likelihood of returning for marriage declines with distance from home, but remarkable that one in ten youths who migrated to London as apprentices married in their home parish. To put this in context, if marriage does indicate return migration, this would account for one in five of London apprentices who did not become citizens in the city. As Table 5 shows, fifteen percent of apprentices from London (all of whom trained in the city) eventually wed in their home parish. That a relatively small share of Londoners were observed marrying locally is not surprising given the large number of parishes in the city, and the popularity of non-parochial

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[20] One of our linkages – that between local children and provincial apprentices bound locally for whom we have no information on the place of origin – would appear particularly vulnerable to producing a false positive finding of local marriage if our linkage is in error. We therefore tested the propensity to marry locally for the sample excluding this group. The likelihood of an apprentice marrying locally actually increases to 33% (16/49) once this group are excluded, although the sample size shrinks.

marriage at the Fleet and other liberties. Presumably, many more were married elsewhere in the metropolis.

Apprentices were buried in their parish of origin with much the same frequency as they were wed there. Only 7 percent of London apprentices were buried locally, compared to 33 percent of provincial apprentices who trained in their parish of origin. Again, there is considerable evidence of apprentices returning to their parish, with 18 percent of provincial apprentices trained in London and 31 percent of those trained elsewhere buried at home.[21]

If we turn to the strongest of our indicators, the distribution of apprentices who are identified as fathering their own family in their parish of origin, we find a similar pattern of apprentices returning to their place of origin. Table 5 reports the distribution of the 169 apprentices who are identified in the reconstitutions as heads of later families. Among apprentices from London, only one in twenty are thought to have started their own family in their parish of origin. As with marriages and burials, the level of this figure should not be over-interpreted, given the number of parishes where they could have settled in the city. Among provincial apprentices, 30 percent of those trained locally were recorded starting their own family. Strikingly, 16 percent of those trained elsewhere and 14 percent of those trained in London later baptised children in their parish of birth. It needs to be noted that the group of apprentices from provincial parishes who are identified baptising children is not just a sub-sample of those who are identified marrying in their parish of origin. Forty of eighty-eight apprentices with families have no marriage record.[22]

When we combine these different indicators to look at the cumulative likelihood that apprentices would re-appear in their parish of origin, we find that one in four apprentices were recorded as having a vital event in their home parish's records after they were bound. A reasonable amount of this is due to continuity in the place of training. Almost half of provincial, and just over a fifth of London, apprentices who were bound locally registered some later event in their parish records. However, there is also substantial evidence of apprentices returning to their parish of origin after entering training elsewhere: 25% of provincial apprentices bound in London and 35% of provincial apprentices bound outside their home but not in London appear in later parish records. No doubt some of these later appearances reflect errors of linkage. Yet the underlying pattern of distance affecting the probability of return is credible, and the effect of inter-generational linkages that might have been missed or excluded in the reconstitutions should, if anything, bias our estimates downwards.

The argument that the decision of apprentices to return home or not was linked to their family and the resources it possessed finds support in the significant effect that parental mortality at the time of binding had on the likelihood of apprentices' later return. For example, taking the provincial and London samples together, 39 percent of apprentices who trained in London with both parents were alive at time of binding have an event associated with return to the home parish (Figure 9). If both parents were dead when the apprentices were bound, the probability of "return" falls to 15 percent: for apprentices who were

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[21] As with marriage rates, it is sensible to test the effect of excluding apprentices linked on the basis of local masters taking apprentices without information of place of origin. Again, if we exclude these potentially weak links, the proportion of apprentices buried locally increases to 37% (18/49)

[22] The London reconstitutions appear to follow slightly different rules: all apprentices with children also have a marriage link.

orphaned when bound their move into a new location for training was likely to be final.[23] Humphries's (2012) research with autobiographies suggests that former apprentices often had strikingly different attitudes towards their fathers than mothers, with many expressing gratitude towards their mothers in particular. This gratitude does not appear to have manifested itself in returning to support a widowed mother: apprentices were not significantly more likely to return in the case of paternal rather than maternal mortality.[24] We lack sufficient information about the timing of apprentices' returns to be able to distinguish clearly between apprentices who were responding to the availability of an inheritance following the death of a parent and those who returned to living parents. However, at least 20 percent of apprentices returned before their last surviving parent died, indicating that inheritance is at best a partial explanation.[25] In general, the relationship between the survival of a parental household and the return of its children to their parish of birth suggests that returning apprentices were drawn back by the advantages presented by the social capital and economic resources of their parents, as we would expect in circular migration.

Conclusions

An apprenticeship was one of the main human capital investment opportunities available to pre-modern families. The decision to undertake such an investment brought with it a series of important economic considerations. Which child should receive the apprenticeship? What were the effects of indenturing a child on their continued connections to the family and home community? The answers to these questions reveal the importance of culture, economic constraints, and intergenerational relationships in shaping private human capital investment decisions prior to industrialisation.

In this paper, we study the household strategies within families that invested in a formal, craft apprenticeship for one of their children. Our analysis provides the first substantial body of evidence on the way non-elite pre-modern families determined the allocation of this kind of human capital investment. In families in which a child was apprenticed, we find evidence of a modest bias against apprenticing the eldest surviving son. This bias was greatest among the sons of provincial farmers. For the children of Londoners bound in their own city there is much less evidence of a distinctive birth order pattern, likely reflecting their parents own direct experience of apprenticeship, its utility as an entry route to citizenship, and the continued proximity of those sons who were bound out. Among the poor, the bias may have been reversed to operate in favour of eldest sons. It seems that the social and economic significance of apprenticeship varied between families depending on the nature of their other property, particularly the relative significance of land holdings, and

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[23] The difference reported for London-based apprentices is statistically significant at the one percent level. We have made similar calculations for the London and provincial groups separately, and for provincial apprentices moving to alternative centres to London. We do not report all of these findings here in the interests of space, but further details are available from the authors on request.

[24] The probability of any form of return is 27 percent with mother dead, father alive, 33 percent with mother alive father dead. The p-value on a two-way z test of proportions on this difference is 0.49.

[25] Our indicator of return records presence in parish of birth, not the date that return occurred. For 107 of 536 apprentices this came before their last surviving parent died (for 69 apprentices the last parent was their father, for 67 it was their mother).

their economic position. For most of the broadly defined middling sorts of English provincial society, apprenticeship was an investment favoured for junior sons, suggesting some commonality of practice with the landed elites. However, it is important not to lose sight of the fact that the scale of the bias was entirely different. Among the gentry, eldest sons were almost never apprenticed. Outside the gentry, a large number of apprentices were eldest sons, even from farming families. This implies a relatively large place for a child's aptitude and interest in shaping their career (Ben Amos 1994) compared to custom or inheritance practices. The contrast is even sharper if drawn against the much stricter birth order rules apparent in studies of Spain and Italy (Barrera-Gonzalez 1992; Ago 1992).

In our investigation of return to the home parish, we find a surprisingly high rate of return migration, questioning the emphasis on neo-locality in most studies of family structures. Many apprentices returned to wed, while others made their way home with a spouse from outside the parish to establish a new family in their home parish. Even apprenticeships within London did not necessarily lead to an irrevocable break with a provincial family and home community. Given this, it seems plausible that parents could anticipate benefiting directly from positive externalities arising from the training provided to children – and that at least some apprentices could hope to advance themselves within their parental business, or with its near support, rather than relying on their own resources in a city far from their birthplaces. As this would suggest, parental mortality emerges as an important factor in the likelihood of apprentices' returning: if the parents had died before indenture, apprentices were significantly less likely to return home later in life.

These findings have several implications for the role of apprenticeship-based human capital formation in supporting economic growth in pre-industrial England. Limited evidence of bias against first sons (or towards second sons) suggests that human capital investments were mainly distributed according to aptitude rather than on the basis of cultural norms based on birth parity. Even in farming families, land did not entirely extinguish alternative options. That many apprentices maintained connections with their home parish after training would have reinforced the incentives of parents to provide training opportunities to those most able to succeed. Our results suggest that pre-industrial parents were interested in allocating opportunities in order to maximize the potential to produce "quality" children, but that poverty and economic disruption imposed large barriers on how much families could provide.

Families that supplied apprentices behaved quite differently from the English elite. Given the numerical and economic importance of this broad social group, their behaviour casts doubt on arguments that assign profound consequences – in entrepreneurship, politics and even imperial adventure - to the application of primogeniture in pre-modern societies (Goody 1983; Goody, Thirsk, and Thompson 1976; Landes 2003: 67), and strengthens and pushes back chronologically arguments for more flexible family strategies existing among non-elite groups that focused on ability over birth order (Johnson and Sabean 2011). The behavioural differences between middling sorts and the top of the socio-economic ladder also challenge recent arguments regarding the diffusion of elite values, and their possible contribution to economic growth (Clark 2006). Where pre-industrial elites were bound by tradition, or constrained by the high costs of partition of part of their estate, they preferred birth position to aptitude; below the upper crust, pre-industrial families behaved much as families do in studies of labour markets in the present day.

14

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Table 1: Linkage Results, by parish and apprentice source

	Livery Companies			Stamp Tax		
	number of apprentices	number linked	% linked	number of apprentices	number linked	% linked
Banbury	258	128	50	77	44	57
Reigate	249	55	22	60	39	65
Other parishes	640	160	25	229	55	24
Total provincial	*1147*	*343*	*30*	*590*	*155*	*26*
Cheapside	98	16	16	15	1	7
Clerkenwell	1951	479	25	288	74	26
St Botolph	1997	314	16	224	28	13
Total London	*4046*	*809*	*20*	*527*	*103*	*20*
TOTAL	**5193**	**1152**	**22**	**1017**	**258**	**25**

Notes: See text for more details on sources. The totals of linked children exceed the final sample size as some apprentices are recorded in both sources.

Table 2: Descriptive statistics for linked samples

	Provincial parishes	London parishes
Parent Occupation		
% primary father	23	5
% manufacturing father	31	56
% distribution and sales father	8	2
% labourer father	5	6
% service father	4	6
% professional father	11	17
% gentleman father	7	1
% unknown	11	7
Family structure		
% eldest sons	39	66
% second sons	31	22
% > second sons	30	11
% female apprentices	1.7	0.6
Male siblings surviving to age 5 (mean)	4.7	1.8
(st deviation)	2.4	1.1
Training		
% in London	76	99
Premium paid, mean (st. error)	15 (21)	20 (31)
N	484	886

Notes: Parent occupation observations for London will be affected by fathers reporting Livery Company membership not occupation.

Table 3: Birth order, sibling, and apprenticeship in provincial parishes

	(1)	(2)	(3) Primary	(4) Not primary
Eldest sons	-.10 (-3.5)	-.12 (-3.8)	-.24 (-3.7)	-.08 (-2.3)
One son				
Two sons	-.44 (-7.2)	-.47 (-6.9)	-.43 (-2.8)	-.46 (-6.1)
Three sons	-.64 (-10.3)	-.68 (-9.8)	-.67 (-4.2)	-.68 (-8.7)
Four sons	-.72 (-11.6)	-.75 (-10.8)	-.82 (-5.2)	-.73 (-9.4)
Five sons	-.79 (-11.4)	-.82 (-10.9)	-.88 (-5.2)	-.80 (-9.3)
Six sons	-.82 (-11.2)	-.85 (-10.4)	-.95 (-5.4)	-.82 (-8.8)
Seven sons	-.84 (-9.9)	-.88 (-9.6)	-1.0 (-5.3)	-.84 (-8.2)
Eight sons	-.84 (-6.6)	-.88 (-6.6)	-.94 (-4.9)	---
Ten sons	-.93 (-5.9)	-.96 (-6.0)	---	-.94 (-5.7)
Female sibship size dummies	Y	Y	Y	Y
Parent occupation dummies	N	Y	N	N
Constant	1.06 (16.9)	1.10 (14.7)	1.18 (7.0)	1.07 (13.9)
R-square	.17	.17	.21	.17
N	1212	1060	251	809

Notes: The dependent variable is a dummy indicator of whether or not the individual was indentured to an apprenticeship. The sample consists of male children who survived to age five in households where at least one male child was identified as being apprenticed. We use the number and rank of siblings (male or female, depending on the case) surviving to age five. Estimated by OLS, t-statistics in parentheses.

Table 4: Birth order, sibling, and apprenticeship in London

	(1)	(2)	(3) Distribution & sales	(4) Not distribution & sales
Eldest son	-.015 (-0.6)	.002 (0.1)	-.109 (-1.3)	.013 (0.5)
One son	-		---	---
Two sons	-.473 (-14.8)	-.463 (-14.0)	-.437 (-3.8)	-.464 (-13.4)
Three sons	-.621 (-16.8)	-.611 (-15.7)	-.705 (-5.7)	-.604 (-14.8)
Four sons	-.701 (-17.0)	-.690 (-15.8)	-.824 (-6.2)	-.674 (-14.5)
Five sons	-.781 (-15.6)	-.771 (-15.1)	-.889 (-6.1)	-.759 (-13.9)
Six sons	-.816 (-11.7)	-.829 (-11.1)	-.922 (-4.7)	-.828 (-10.4)
Seven sons	-.821 (-8.3)	-.856 (-8.4)	---	-.056 (-0.2)
Eight sons	-.893 (-5.9)	-.879 (-5.8)	---	---
Female sibship size dummies	Y	Y	Y	Y
Parent occupation dummies	N	Y	N	N
Constant	1.02 (29.7)	0.98 (17.1)	1.11 (9.7)	.99 (26.5)
R-square	.31	.32	.39	.31
N	1637	1514	144	1370

Notes: The dependent variable is a dummy indicator of whether or not the individual was indentured to an apprenticeship. The sample consists of male children who survived to age five in households where at least one male child was apprenticed. We use the number and rank of siblings (male or female, depending on the case) surviving to age five. Estimated by OLS, t-statistics in parentheses.

Table 5: Evidence of Continued Activity in Place of Origin

		Provincial Reconstitutions	London Reconstitutions	All Children
Number of children	Apprenticed locally	66	889	955
	Apprenticed in London	369		1258
	Apprenticed elsewhere	49		49
% married in home parish	Apprenticed locally	30	15	16
	Apprenticed in London	10		14
	Apprenticed elsewhere	16		16
% buried in home parish	Apprenticed locally	33	7	9
	Apprenticed in London	18		11
	Apprenticed elsewhere	31		31
% with children baptised in home parish	Apprenticed locally	30	5	7
	Apprenticed in London	14		8
	Apprenticed elsewhere	16		16
% any presence in home parish	Apprenticed locally	44	22	24
	Apprenticed in London	25		23
	Apprenticed elsewhere	35		35

Notes: See text for sample details, and Appendix table A2 for detailed statistics by parish of origin.

Appendix Table A1: Apprenticeship and birth order by sibship parity

London reconstitutions

Male sibship size	% eldest, all males	% eldest, apprentices	t-statistic on eldest coefficient	N apprentices
1	100	100		388
2	50	51	0.37	248
3	33	33	>0.01	126
4	25	18	-1.65*	77
5	20	11	-1.40	28
6+	16	29	0.49	14

Provincial reconstitutions

Male sibship size	% eldest, all males	% eldest, apprentices	t-statistic on eldest coefficient	N apprentices
1	100	100		75
2	50	45	-1.75*	137
3	33	29	-1.19	94
4	25	14	-2.84***	91
5	20	15	-.79	33
6+	16	11	-.82	36

Provincial reconstitutions, primary sector

Male sibship size	% eldest, all males	% eldest, apprentices	t-statistic on eldest coefficient	N apprentices
1	100	100		75
2	50	39	-1.75*	137
3	33	22	-1.19	94
4	25	5	-2.84***	91
5	20	0	-.79	33
6+	16	0	-.82	36

Appendix Table A2: Evidence of Continued Activity in Place of Origin, Parish Details

Parish	N London	N Local	N Non local	% any return London	% any return Local	% any return Non local	% children London	% children Local	% children Non local	% marry London	% marry Local	% marry Non local	% buried London	% buried Local	% buried Non local
March	5	9	3	20	22	0	0	22	0	20	22	0	0	11	0
Alcester	36	6	7	19	50	14	11	17	14	6	33	14	17	33	14
Aldenham	40	0	1	33		0	13		0	8		0	28		0
Austrey	7	0	2	29		0	14		0	0		0	14		0
Banbury	138	18	10	18	61	40	7	50	30	8	44	20	10	56	40
Birstall	5	0	0	20			0			20			0		
Bottesford	6	2	3	17	50	33	17	50	33	17	50	33	17	50	33
Colyton	8	0	0	63			38			25			63		
Great Oakley	0	1	0		100			100			0			100	
Lowestoft	4	3	3	25	33	67	25	0	0	25	33	0	25	0	67
Odiham	31	3	3	32	0	67	32	0	33	13	0	33	26	0	67
Reigate	61	13	14	34	15	36	21	15	14	11	15	14	28	0	21
Shepshed	28	11	3	18	73	67	11	36	0	11	36	33	14	64	67
Provincial	369	66	49	25	44	35	14	30	16	10	30	16	18	33	31
St Botolph Aldgate	333	333	0	12	12		4	4		9	9		2	2	
Cheapside	16	16	0	6	6		0	0		6	6		0	0	
Clerkenwell	540	540	0	29	29		6	6		19	19		11	11	
London	889	889	0	22	22		5	5		15	15		7	7	
Total	1258	955	49	23	24	35	8	7	16	14	16	16	11	9	31

Figure 1: Training and birth order among the elite

Source: Wallis and Webb (2011)

Figure 2: Parish locations
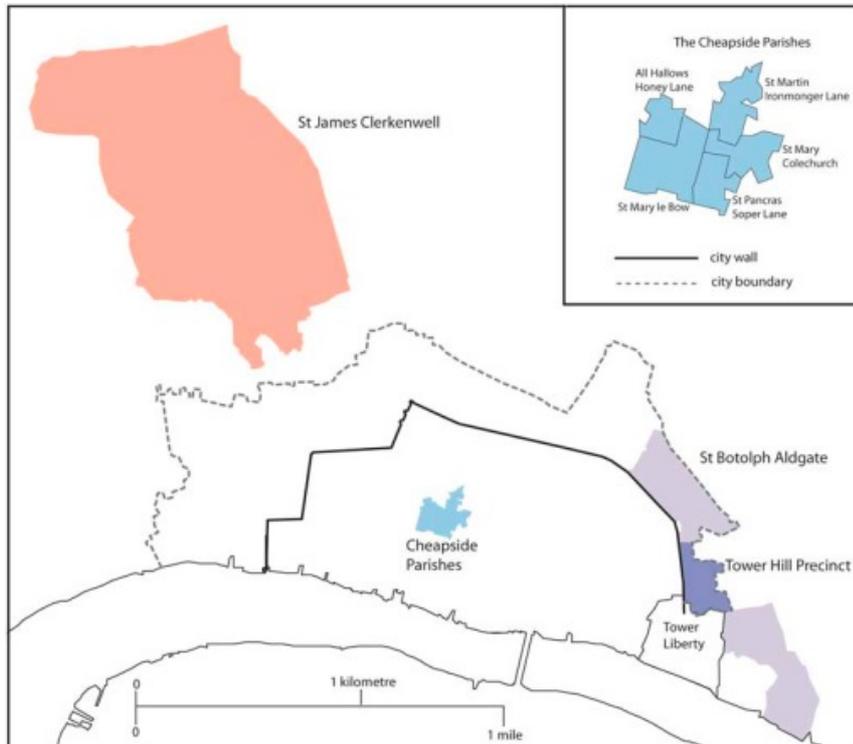
Note: Map of reconstitution parishes from Wrigley et al 1997, fig. 2.1, reproduced by permission of Cambridge University Press. Map of London reconstitutions from People in Place project (http://www.history.ac.uk/cmh/pip/project.html)
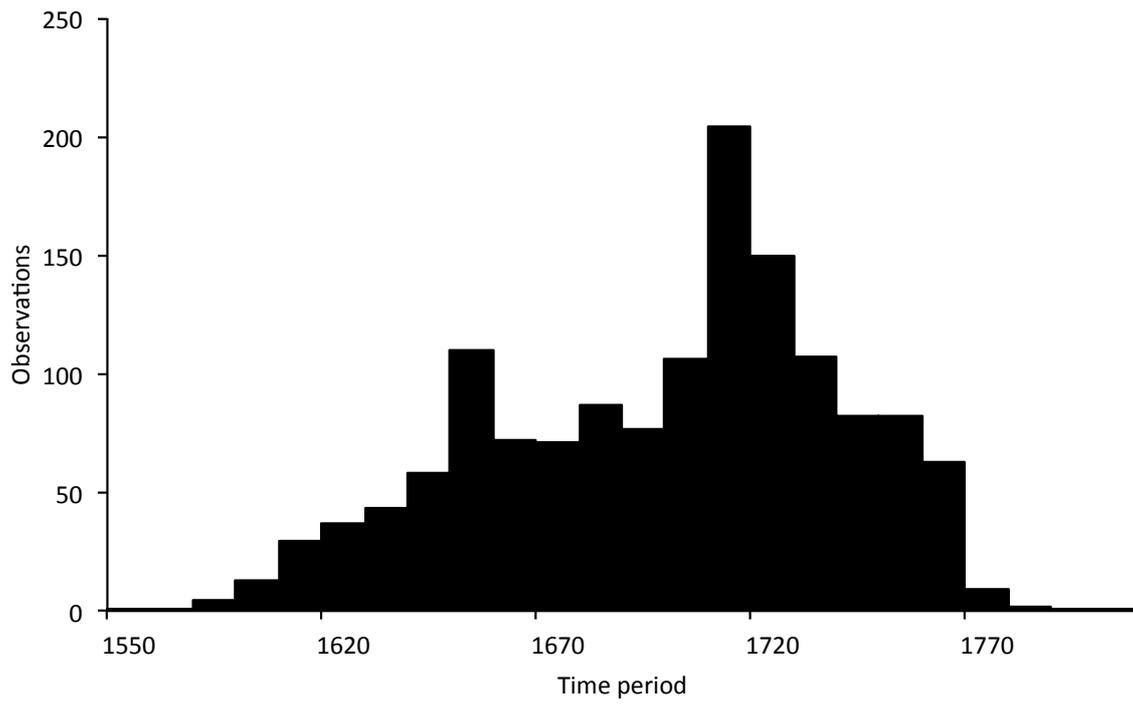
Figure 3: Temporal distribution of linkage results
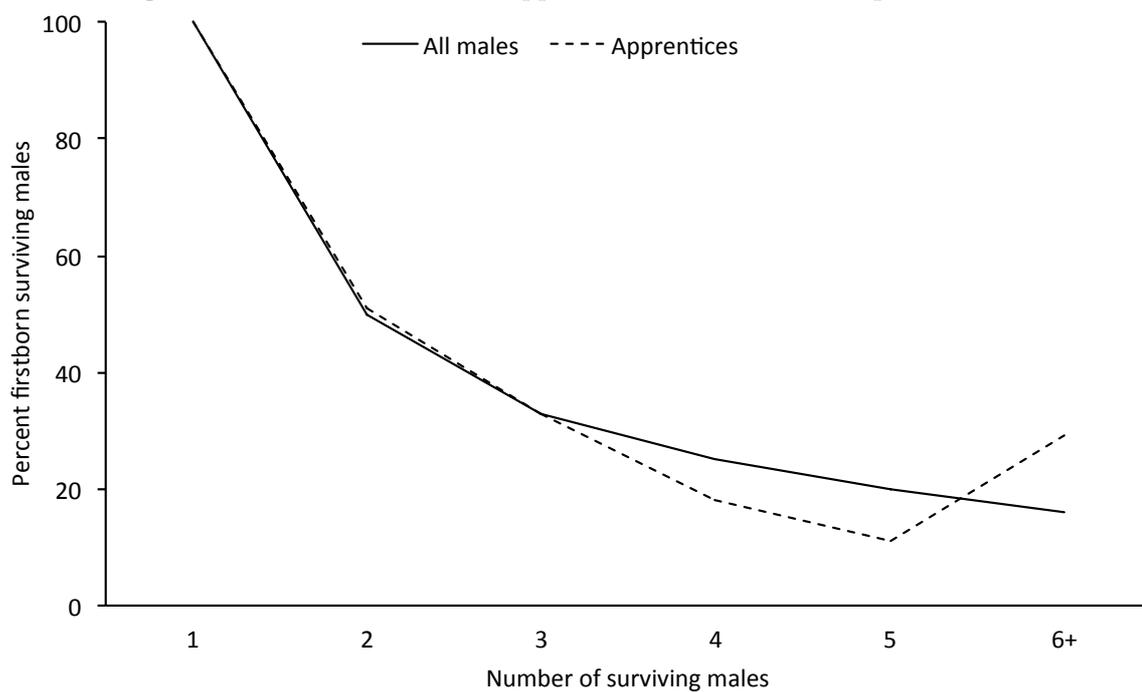
Figure 4: Eldest son shares in apprentice families, provincial parishes
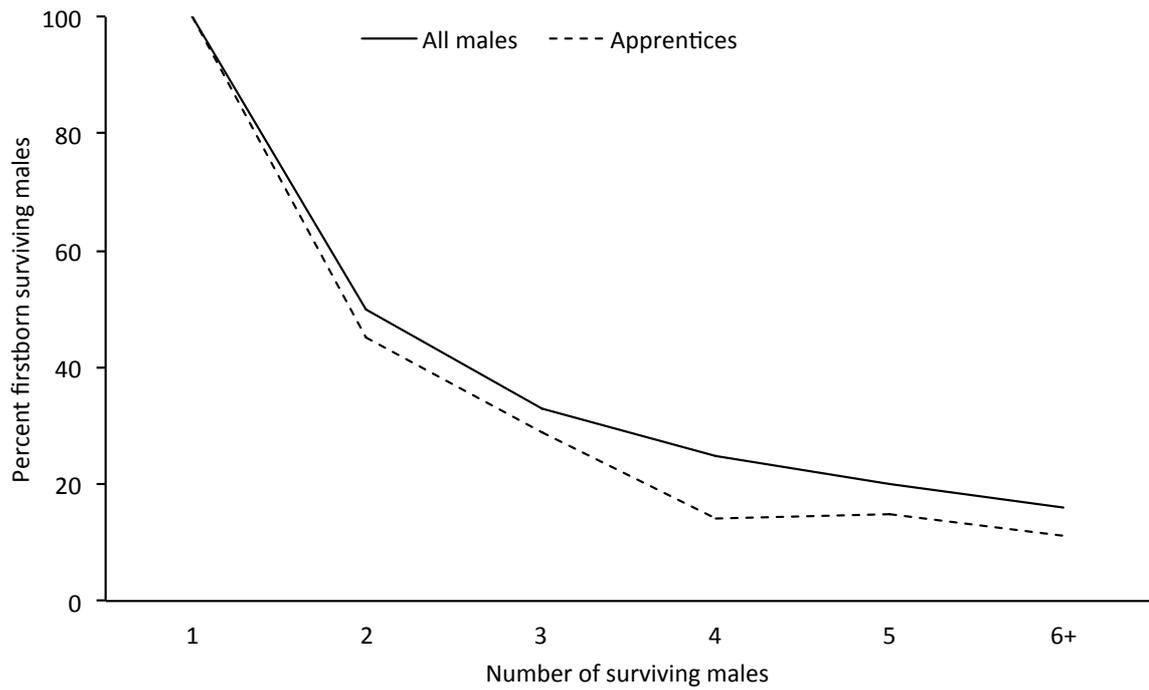
Notes: The 'All males' line gives the share of sons who will be the eldest son in families with n surviving sons in a general population. The 'Apprentices' line reports the observed share of apprentices in our sample who were the eldest son in their family.

Figure 5: Eldest son shares in apprentice families, provincial parishes, primary sector
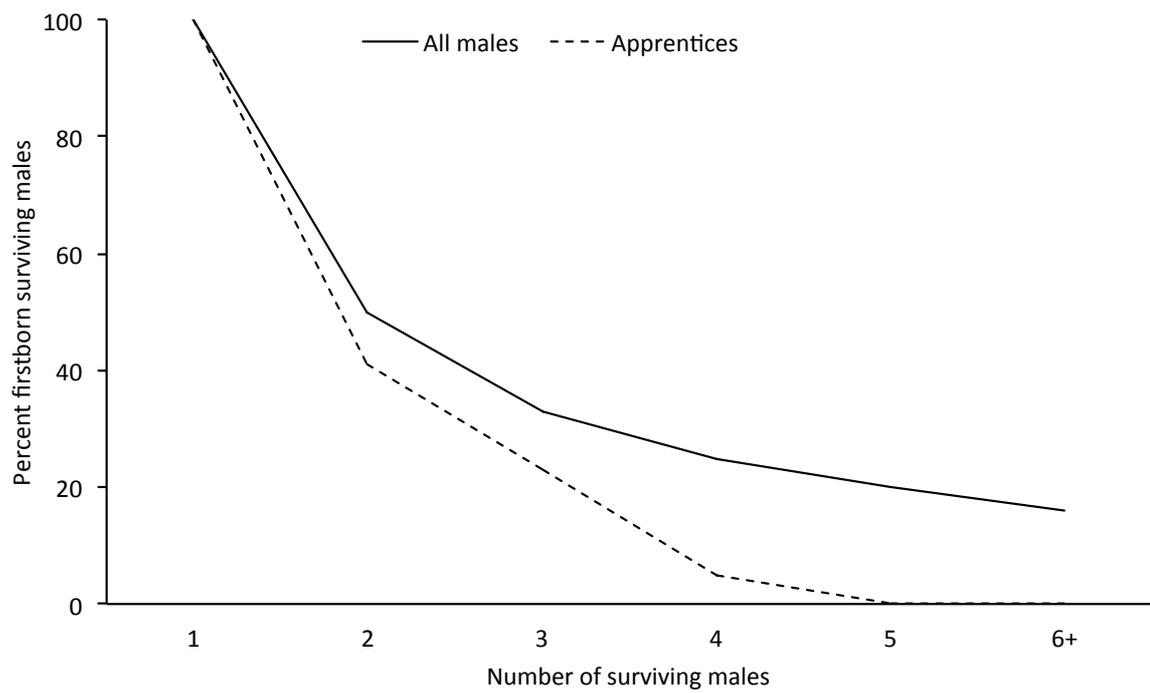
Notes: The 'All males' line gives the share of sons who will be the eldest son in families with n surviving sons in a general population. The 'Apprentices' line reports the observed share of apprentices in our sample who were the eldest son in their family.

Figure 6: Eldest son shares in apprentice families, London parishes

Notes: The 'All males' line gives the share of sons who will be the eldest son in families with n surviving sons in a general population. The 'Apprentices' line reports the observed share of apprentices in our sample who were the eldest son in their family.

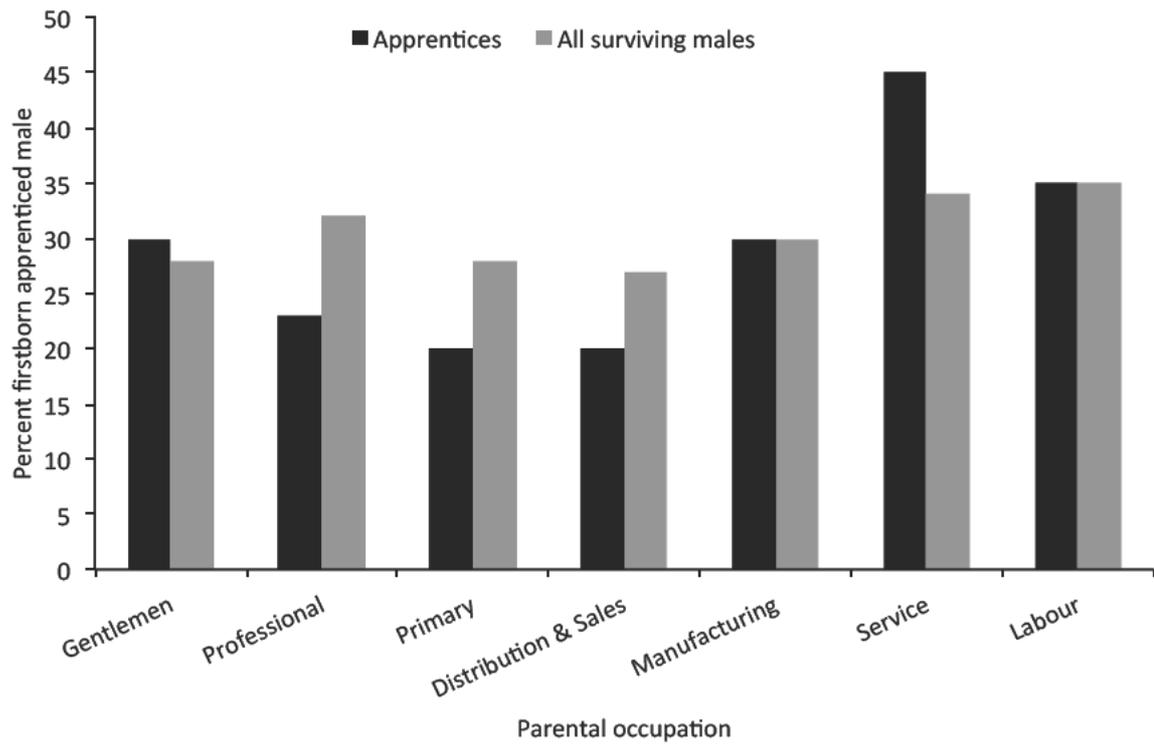Figure 7: Eldest shares, by occupation, provincial parishes
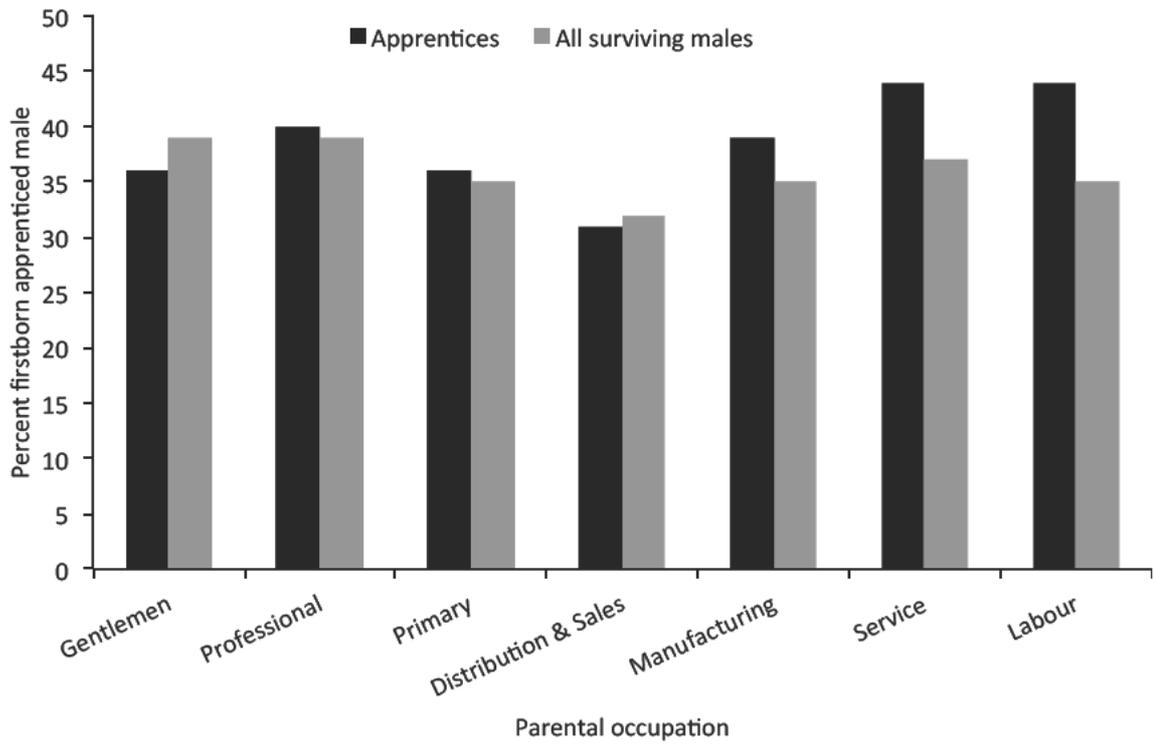
Figure 8: Eldest shares, by occupation, London sample

Figure 9: Parental mortality and return to home parish