

Work, training, and economic mobility in premodern societies: new evidence from English apprenticeship records

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## **Abstract**

This paper uses newly digitised apprentice records to provide a statistical portrait of the London apprenticeship market between 1600 and 1750. We find little evidence in favour of the importance of social and geographical networks in shaping apprentice recruitment. London apprentices migrated from all over England, showing little bias towards larger market towns. The typical London apprentice did not have an identifiable connection to his master in the form of a kin link, shared name, or shared county of origin. The typical London apprentice was the son of a father with little exposure to the trade the apprentice had entered; the majority of migrant apprentices were the sons of fathers outside of the craft sector. Our results suggest that the market for apprenticeship was strikingly “modern”, with would-be apprentices able to match ability to opportunity.

## Introduction

Among the most enduring assumptions about the premodern world are that an individuals' opportunities were determined by their origins, and that information flows were weak. Whether social, geographical or occupational, movement was constrained by lineage, kin, place, faith, gender, caste or other barriers. In this view, the premodern world was stagnant and dynastic: the shoemaker's son would be a shoemaker; the Yorkshireman would stay in Yorkshire. The poor quality of information flows limited choices further: contracts with strangers were hard to write and enforce; news about opportunities or problems was slow to travel; political, social and economic coordination was difficult. Modernity, by contrast, is defined by individualism and self-definition: jobs, places, social roles are open to all, and distributed through a contest based on talent not prior title; information flows quickly and easily, sustaining states, institutions and economies alike. This contrast was already clear in de Toqueville's contrast between the 'general equality of conditions' that he saw in America (and to a lesser extent Revolutionary France) and the 'immutable order of nature' that had previously governed European societies for generations.<sup>1</sup> Similarly, limited mobility is inherent in Tonnies idea of *Gemeinschaft*, in many of Adam Smith's attacks on corporations and aristocracy, and in Marx and Engels's stylized account of medieval class formation in which individuals 'find their conditions of existence predestined, and hence have their position in life and their personal development assigned to them by their class'.<sup>2</sup> These accounts have shown great longevity, and they are today being reinvigorated in studies of social networks and social capital.

In this paper, we use patterns of apprenticeship to engage with the questions of how open or closed premodern society actually was, and how great were the constraints imposed on society by the quality of information flows. These questions have their own long lineage. As numerous analyses have revealed, premodern social reality was more complex than the stylised oppositions sketched by de Toqueville and his successors. Their stylised accounts of the premodern social order were, of course, rooted in people of that period's own conceptualization of society as necessarily hierarchical, with rank defining the proper order of people's existence and securing government.<sup>3</sup> Order was, in most premodern accounts, a value to be defended, and we can find, many attempts to enforce hierarchies in

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<sup>1</sup> De Toqueville, *Democracy in America*, v. i. introductory chapter, opening paras

<sup>2</sup> Marx & Engels, *The German Ideology*, p 82.

<sup>3</sup> Wrightson, 'society of orders'

premodern Europe.<sup>4</sup> The government and much of the wealth of early-modern Venice was in the hands of an exclusive class of 'nobeli' and 'cittadini'.<sup>5</sup> In England, the Heralds toured counties to examine families' assertions of gentility, and the Statute of Artificers sought to keep agricultural labourers within farming. Ogilvie has shown how Wurttemberg weavers exploited their position to exclude foreigners.<sup>6</sup> The so-called second serfdom ossified opportunities in parts of Eastern Europe. Equally, there is some compelling evidence of social mobility.<sup>7</sup> Mobility in and out of the English gentry has been observed repeatedly. [inc Wrightson; Stone; MacFarlane argued XXX]. Recently, Gregory Clark has argued that differential fertility made downward social mobility inevitable.<sup>8</sup> However, the actual impact of constraints on occupational, geographical and social movement outside the aristocracy has proved hard to measure. And there is almost no evidence on how levels of movement changed in the centuries leading up to industrialisation.

Apprenticeship has several characteristics that make it particularly useful when considering questions about mobility and information.<sup>9</sup> First, apprenticeships mattered greatly as an institution in pre-modern Britain. They were critical to human capital formation, since they were one of the primary ways by which youths acquired the craft skills they would use later in life. Apprenticeship was, of course, not the only source of skills: most youths were still trained in their families and, at the other end of the scale, some others, particularly early inventors, sought out a wide range of instructors outside formal contracts of service. Apprenticeship was, nonetheless, a very large element in the premodern training market. Second, apprenticeship encompassed a wide social range. Apprentices might be youths from small artisan and minor farming families, and even a few sons of labourers, alongside the younger sons of gentry and substantial merchants. Third, for many people migration was necessary to begin an apprenticeship. In particular, many people migrated to London when they began their apprenticeship.<sup>10</sup> Roughly, 3-6% of all English teenagers travelled to London to enter an apprenticeship in the seventeenth century. Under the

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<sup>4</sup> Cf. summary in Friedrichs

<sup>5</sup> Cowan, *Urban patriciate*.

<sup>6</sup> Ogilvie, 'social capital'.

<sup>7</sup> Article on gentility and work in Spain; Stone in P&P; Farr; Friedrichs

<sup>8</sup> G. Clark, *A farewell to arms*.

<sup>9</sup> Apprenticeship has been widely studied more generally, including work by Humphries 'English Apprenticeship'; Epstein 'Craft guilds'; Ogilvie 'Guilds'

<sup>10</sup> This pattern was also common elsewhere in Europe, Ehmer "Worlds of Mobility", p. 172

extreme assumption that none of them later entered agricultural occupations, XX of those working in manufacturing and trade in this period would have at least entered training in London at some stage in their careers. Arranging and apprenticeship was therefore a moment when we would expect families fully to exploit their networks and the information about opportunities available to them.

The rates of migration observed through apprenticeship records do, in themselves, offer an argument against the idea of a premodern *societe immobile*. One of the compelling findings of the new social history of the 1960s and 1970s was that rates of migration in premodern England and Europe were much higher than had previously been imagined. Apprenticeship migration has formed part of this literature. But in these accounts of mobility, most historians have argued that networks based on common geography, kin and occupation provided necessary threads along which all but the most desperate of migrants moved. Rappaport pointed to the importance of networks of relative and friends, and suggested that 'trade routes between London and other towns aided the placement of prospective apprentices.' Peter Clark also emphasised the importance of personal connections and kinship: 'residual contact with one's place of origin was a characteristic of betterment migration as a whole... the urban immigrant was expected to look after the education as well as employment of his rural kinsman coming to town.'<sup>11</sup> Ben-Amos, Yarborough, and Lovett et al all put forward similar explanations for how movement was managed in premodern England. This evidence points to a dynastic model of human capital formation, where youths from families with craft skills, or established connections to individuals affiliated to craft training centres, dominated the market for apprenticeship. In this analysis, apprenticeship becomes another measure for the strength of social capital as a necessary and limiting characteristic of premodern society, much as Ogilvie has shown for Wurtemberg how guild-regulated apprenticeship could operate to exclude those who lacked the necessary connections.

In this paper we employ a new and more extensive body of evidence from London's apprenticeship records to examine the market for human capital formation in England in the seventeenth and eighteenth centuries. To assess the importance of social networks in securing contracts, we evaluate the importance of networks based on kin, shared geography and common occupation in structuring access to apprenticeships. To examine the quality of

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<sup>11</sup> Clark, 'Migrant in Kentish towns', p. 136.

information flows over time and space, we consider the degree to which distance from London affected youths' opportunities, and look for evidence of chain migration. We find that mobility, as measured across several dimensions, was far higher than anticipated. We also find that information flows about opportunities seem to have been surprisingly effective, and there is little evidence of the chain migration or regional specialization that we would expect to observe in situations where poor information limits choices. Rather than being channelled into particular training positions by their pre-existing networks, English youths faced a wide pool of varied opportunities. Their prior connections – and above all their financial resources and gender – undoubtedly helped them to steer their own course through this pool. But the apprenticeships they ended up in were largely with individuals from far outside their own social networks: these were long-term contracts involving substantial costs and risks that seemingly operated despite the lack of trust-enhancing prior social connections between the parties. The typical London apprentice was a migrant bound to a master who engaged in a different trade to their father's, and with whom they had no familial or geographical tie. These results suggest that English youths entering London apprenticeships had the potential to successfully match their aptitudes to available training opportunities, regardless of where they came from, who their father was, and whatever the geographical and social origins of their potential master.

### **Premodern Apprenticeship**

Premodern apprenticeship operated in a distinctive legal and institutional framework. In England, the Statute of Artificers (1562) established national rules for apprenticeship based on London's existing customs. Apprenticeship terms were set at a minimum of seven years, and apprentices were to be at least 24 years of age upon completion. Successful completion of an apprenticeship was the main basis on which apprentices became freeman or citizens of the town or city in which their training had taken place, and this allowed them to use their occupation independently thereafter. In towns, artisans were required to be freemen to take apprentices, and were usually required to register apprentice contracts with local guilds and the authorities of incorporated towns and cities. The extent to which the Statute was enforced, and training for occupations is fully accounted for through registration and enrolment, is subject to debate.<sup>12</sup> However, the

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<sup>12</sup> MG Davies; Ben-Amos; Walker; Snell; Schwarz; Wallis

scale of entrance to apprenticeship is clearer. A very large number of apprentice contracts in London and elsewhere were recorded by the city's Companies (as London's guilds are known) who regulated and policed some aspects of apprenticeship. These records allow us to create a rich portrait of the operation of the apprenticeship market over the course of several centuries.

Certain of the characteristics of premodern apprentices are well-established. Apprentices in this era were almost invariably young, almost all male, migrated further than subsistence migrants, and came from relatively affluent backgrounds.<sup>13</sup> Some studies point to a rise in the economic status of apprentice backgrounds over this period, and the outlines of apprentices' migrations are also well-studied.<sup>14</sup> By the seventeenth century, masters offering apprenticeships increasingly required the payment of a premium to them at the time of binding. Premiums varied by trade, but could easily exceed a year's agricultural wages for a moderately prosperous trade. Apprentices resided with their master during the training period, but received no wages, and their board and clothing might be subsidised by their parents or sponsors. The costly nature of apprenticeship meant that it was available mainly to youths from families wealthy enough to finance both the up-front and opportunity costs. By and large, it was not a practice that would allow poor families to improve their economic status, but rather one that middle class families could use to provide human capital and economic opportunities for their children.<sup>15</sup>

Given the costly nature of apprenticeship, it is likely that families investigated the possibilities as thoroughly as they could.<sup>16</sup> Not only did families need to be sure of the quality of training that their son would receive, the master also had to have a sense of the quality of apprentice being offered. Surprisingly little is known about how individuals chose their master, or about how masters chose their apprentices. Evidence drawn from surviving records often show kin or others known to the would-be apprentice's family acting as

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<sup>13</sup> Rappaport, 'Social Structure'

<sup>14</sup> Brooks, 'Apprenticeship'; Clark and Souden, 'introduction'; Stone, 'Social mobility'; Kitch, 'Capital and kingdom'; Rappaport, 'Social Structure'; Wareing, 'Geographical distribution'; Smith, 'Social and geographic origins'; Whyte, 'Migration'; Ramsay, 'Recruitment'

<sup>15</sup> The exception to this was pauper apprenticeship, arranged and funded for poor children through parish rates. Few London apprentices appear to have fit this category, and the arrangements involved raise different questions, so we have excluded pauper apprentices from our analysis.

<sup>16</sup> Brooks, 'Apprenticeship', cf. Mitchell 'British Historical Statistics'.

intermediaries.<sup>17</sup> For example, the apprenticeship of Bartholomew Adsworth to one Mr Walton, a cooper, in 1688 had been arranged by his cousin, George Fox, who was a citizen and Vintner of London.<sup>18</sup> Graves Baker's brother, Thomas, placed him with his master, Thomas Bland, a gold and silver wiredrawer.<sup>19</sup> Daniel Clarke of Tring, Hertfordshire arranged the service of his son Francis with the help of 'friends', probably including Francis's uncle, who together sought a 'freeman & one that dealt Considerably in his way of trade & was a fair dealing man'. Unfortunately the master they found, the haberdasher Samuel Booth, proved to be abusive.<sup>20</sup> George Long of Ludlow also arranged for his friends to make a 'diligent enquiry' for a 'fit person' for his son to serve, choosing John Crundall, a clothworker.<sup>21</sup> There are at least two pieces of evidence, however, that suggest arrangements that would better match aptitude to opportunity, and enable youths without commercial connections to get a foothold into the trades. First, trial periods, in which apprentices and masters established their respective suitability, were a standard practice. For example, before his indentures were sealed, Adsworth spent between six and twelve months with his master 'on liking'. Second, it appears that turnover and early departure was common among apprentices.<sup>22</sup> This may reflect the establishment of apprentice-master relationships in which both parties were willing to set terms in variance with standard arrangements prescribed by Statute. It is also consistent with a training market in which bad matches, perhaps the result of limited information available to both contracting parties, were allowed to dissolve should it be in the interest of either party. This flexibility would make it easier for apprentices and masters to sign indenture contracts with parties with whom they had little prior contact.

## Data

Previous studies of apprenticeship have been constrained by the nature of the data available. Researchers have established certain facts, particularly as regards the high rate of apprentice migration to London and other centres, but much of this work is narrow in focus, concentrated on particular time period or by Company, or by looking in detail at a relatively

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<sup>17</sup> Ben-Amos, 'Adolescence', LMA, MC6/500A, CLA/024/07/81

<sup>18</sup> LMA, MC6/500A (Sept 1689) CHECK in DB

<sup>19</sup> LMA, MC6/520B.

<sup>20</sup> CLA/024/07/81, #4. Clarke v Booth (c. 1695).

<sup>21</sup> CLA/024/07/81, #5, Long and Long v Crundall (c. 1695)

<sup>22</sup> Wallis, JEH; Minns & Wallis, 'Practice'.



limited number of apprentices for whom particularly good records survive.<sup>23</sup> Our analysis of the apprenticeship market is based on a database of apprentice records several orders of magnitude larger than that available to previous authors. We have constructed a dataset based on the extensive series of extracts from London Companies' own manuscript records that have been digitised by Cliff Webb and published by the Society of Genealogists. Webb's lists contain the details of all apprentices recorded by the officials of 65 London Companies for the period for which their records survive and have been digitised.<sup>24</sup> In total, our data contain records of over 161,000 apprentices bound to more than 53,000 London masters.<sup>25</sup> We focus our study on the years between 1600 and 1750, for which we have records for 118 thousand apprentices and 42 thousand masters. The data include apprentices' name and place of origin, their parents' name and occupation or status, whether their father was still alive, their master's name, and the Company and date on which they were bound.<sup>26</sup>

The apprentice database allows us to investigate the relationship between apprentice and master in ways that are more systematic than has previously been possible. In themselves, the apprenticeship records provide few details on the masters, but we have taken advantage of the fact that the most London masters were themselves originally apprentices in London. This has allowed us to identify 12,320 masters' own apprenticeships for those training between 1600 and 1750. This represents over a quarter of the total number of masters taking on apprentices over this interval.<sup>27</sup> These masters in turn took on

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<sup>23</sup> For examples: McKenzie, 'Stationers Company'; Keen, 'Metropolitan values'; Ben-Amos 'Service'

<sup>24</sup> In addition, we include records of apprentices in the Stationers' Company, and a sample of apprentices in the Drapers Company: SOURCES.

<sup>25</sup> These are the number of different master name and surname combinations that appear in the data. We use Double Metaphone to classify written surnames; this means that Jim Smith and James Smythe are considered to have the same name. We use company and names to identify individual masters, so the number of potential masters is larger than the number of unique name combinations.

<sup>26</sup> It is important to emphasise that London Companies included members working in a variety of trades outside the occupation they formally governed and represented. Company is therefore a weak indicator of occupation.

<sup>27</sup> We use the Double Metaphone algorithm to generate phonetic codes for the full list of apprentice and master names, and search for unique name matches within the appropriate company and time interval. We search for the apprentice record of masters 7 to 50 years before they take on their first apprentice, and excluded all duplicate names within the same company.

35,838 apprentices.<sup>28</sup> For those thirty-eight thousand apprentices, we know not only their name, and place of origin, but also the name and place of origin of their master.

The first apprenticeship recorded in our dataset began in 1496, while the last commenced in 1928. Our data cover around 4% of the entire male population of relevant age in the period 1600-1750.<sup>29</sup> The records do not include all the large, prominent companies; for example, the Goldsmiths and Merchant Tailors' Companies are not included in the records currently available for our use. The records do include a wide range of companies, from large, well-established companies such as the Stationers and Vintners, to smaller, more specialised companies that come into existence over the course of the 17<sup>th</sup> and 18<sup>th</sup> centuries, such as Apothecaries and Spectaclemakers. It seems likely that at least a third, and perhaps even a half or more of all London apprentices in the seventeenth and eighteenth centuries are included in our dataset.

In the analysis that follows, we focus mainly on developments between 1600 and 1750. These are the years where the records we use are most complete. Figure 1 plots the distribution of apprenticeship observations in our data over time. We do not wish to claim that Figure 1 is representative of the rise and fall of apprenticeship more generally. There undoubtedly were changes in the number of youths receiving craft training over the period, but Figure 1 also reflects changes in the creation and survival of Companies' apprenticeship registers. Better survival of records largely explains the rise from 1600 to 1700, though the fluctuations in the mid to late 17<sup>th</sup> century fit well with well-known crises in London, such as the Great Fire and plague epidemics, that led to slower recruitment followed by restocking. The decline in apprentice numbers from 1700 to 1800 is partly a reflection of London's shrinking recruitment field: falling apprentice migration to London was associated with a fall in numbers in apprenticeship. But the decline in observations also reflects the fact that an increasing share of youths trained in occupations without bothering with one of these regulated and recorded apprenticeships, as Companies' control of occupations weakened and the variety of trades expanded.

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<sup>28</sup> The ratio of to the number of apprentices to masters in this matched sample is within 5% of the ratio for the full sample, suggesting no material bias towards masters with either a large number, or a small number of apprentices.

<sup>29</sup> **FILL IN DETAILS OF CALCULATION.**

Figure 2 shows how London's recruitment field changed over the pre-modern period. As early as the 14th century, London had already attracting apprentices from provincial England, and by the mid-16th century, almost one half of apprentices who became Freemen came from counties of the north and west of England; more than three times as many as had been born in London.<sup>30</sup> As Waring and other have noted, early 17th-century apprentices were still drawn from a wide area across England, and this then declined in the later 18th century. In the early 17<sup>th</sup> century (1600 to 1625, Figure 2a) and early 18<sup>th</sup> century (1700 to 1725, Figure 2b) counties in southern England and the west Midlands have the highest rates of apprentice migration. Recruitment rates are reasonably high from Northern England, with only Cornwall and Devon sending minimal numbers of apprentices to London. By the late 18<sup>th</sup> century (1750 to 1775, Figure 2c), London and Middlesex youths dominate apprentice recruitment. Numbers had declined substantially from other southern and Midland counties, and very few apprentices were coming from Northern England after 1750.

### **The role of networks in apprentice recruitment**

We use the apprentice data to assess the extent to which the youths seeking training within the pre-modern English economy were reliant on pre-existing familial, geographical and occupational connections. Migration was necessary for most youths seeking apprenticeships in London, and we are able to document the extent to which entry into the London training market was constrained by weak information flows over distance or from urban into rural communities.

#### *Kinship*

We begin the analysis with an investigation of the importance of kinship. We can use our data to explore the extent to which kin apprenticeship was a significant phenomenon. Direct kin relations are recorded in the company records: in our matched sample of almost 50 thousand apprentices (check), just over 1300 are known to be related to their master. The bulk of these kin links were father-son relationships, with this mode increasingly common after 1750. Masters may also have taken on more distant relatives who are not

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<sup>30</sup> Thrupp, 'Merchant class'; McClure, 'Patterns'; Rappaport, 'Social Structure'; Wareing, 'Geographical distribution'.

identified as kin in the company records. One proxy for a distant paternal family relationship is whether a master and apprentice share a surname. For common surnames (e.g. Smith), a shared name may not indicate kinship, but if masters and apprentice share an unusual surname it is likely that both are kin. We restrict ourselves, therefore, to apprentices with unusual names.<sup>31</sup>

Table 1 shows that few apprentices are recorded as being directly related to their master: on average only 0.5% of apprentices were bound to a known relative (column 1). The figure for kin links is somewhat higher for London-born apprentices at 2.3% (column 2), but this is still a strikingly small number. Fewer than 7% shared an unusual surname with their master (column 4). Inevitably, this measure will miss any links through maternal relatives, and paternal relatives who do not share the same family name as the apprentice (for example, an apprentice indentured to the brother-in-law of his father), as well as capturing an unquantifiable number of non-kin surname matches. It is unclear what “multiplier” one would apply to the figures in Table 2 to adjust for these missing links.<sup>32</sup> Under the simple assumption that “kin” consists of parents, uncles and aunts, and their spouses, it is plausible that only a quarter of a youths’ uncles and cousins would share their surname. However, there is little certainty that the multiplier of four that this would suggest is actually correct, as it relies on assumptions about the distance and strength of kin ties for which we have little evidence. Whether kinship rates are 7% or 28%, these rough approximations still make one thing clear: that kinship was not the usual method of joining masters and apprentices.<sup>33</sup> Using a kinship tie may well have been common for those who had kinship ties, but it was not a critical factor in explaining who migrated to London to take up an apprenticeship.

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<sup>31</sup> Unusual names were defined as those that occur fewer than six times among the 356,000 people named in marriage licenses issued by the Vicar-General’s of the Archbishopric of Canterbury for the period 1694-1800. Available from <http://www.sog.org.uk/vg/index.html>

<sup>32</sup> In performing a formal calculation along these lines, we would ideally know the number of adults siblings of the typical adult. Under the assumption that the sex ratio is 50 percent and that all adults marry, we could determine the number of adult kin of prospective apprentices, and the number who share a surname. Dividing the first of these numbers by the second would provide us with an empirical multiplier. We are consulting members of the Cambridge Population Group to determine if it will be possible to come up with a calculation along these lines.

<sup>33</sup> As we will see, relatively few people were apprentices to someone from the same town, but with whom they did not share a name. This suggests that omitting such people from our definition of kin introduces a relatively small error.

Masters do not appear to have sought out kin apprentices. Even among masters who recruited heavily and took on more than 10 apprentices, only 1 in 3 trained an apprentice with the same name at some stage in their careers. Among masters who did take family members as apprentices, it was rare to train more than one: only 13 of the 147 masters with a kin apprentice trained more than one identified family member. Nor were there significant numbers of masters who did not usually take on apprentices, but who made an exception for members of their family: only 1 in 10 of those who took only one apprentice shared a surname with that apprentice. If we apply the crude multiplier described above, master-apprentice kin links remain in the minority. It is likely that having a master in the family made it easier for young men to take up an apprenticeship in London,<sup>34</sup> but being related to one's master was not required, or even common.

#### *Geography and local connections: town networks*

It is not necessary to be related to a master to know them and to be known by them. Most masters were themselves migrants to London. In theory, the links between London masters and their places of origin in the provinces left by this movement could have led to them recruiting apprentices from the same locality for several reasons. Masters may have indentured apprentices from their town of origin if home connections allowed masters to acquire information about the youth's suitability at relatively low cost. Taking apprentices from their home town would also be a way for masters to meet expectations about using their own success to help friends and neighbours.

If local information was crucial to apprentice recruitment, we might expect to observe a substantial degree of "home bias," with migrant masters hiring mainly migrant apprentices from their town or county of origin. The unique nature of our sources allows us to measure the degree to which apprentices were matched with masters with whom they share a geographical tie. In Table 3, we use the sample in which masters have been linked to their apprenticeship records to examine whether town connections were common between migrant masters and migrant apprentices.<sup>35</sup>

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<sup>34</sup> We intend to explore patterns of selection into apprenticeship for those with and without kin ties in the trade at a later date.

<sup>35</sup> In this table and the ones that follow, we limit our attention to migrant apprentices and masters, excluding those originating in London or Middlesex.

Column 1 of Table 2 lists percentage of apprentices who joined a master from their place of origin, and column 2 gives the percentage of masters with at least one apprentice from their home town. To reduce the incidence of kinship-based geographical commonality, we also report the results excluding any master and apprentice who shared the same name, however common that name may be (columns 3 and 4). Excluding same-name town links does not yield a perfect measure of non-familial geographic connections. Some of the town links we observe likely consist of apprentices indentured to kin masters who do share a surname, so the figures presented should be thought of as an upper bound on non-kin town links. The main message from this table is that home town links were not particularly important in shaping apprentice recruitment patterns. Only 4 percent of apprentices were trained by a master from their home town without a common name.

There is also no significant evidence that masters limited themselves to apprentices from their home town or were looking to their hometown particularly as a source of apprentices. Just over one-third of masters who recruited over 20 apprentices through their career had at some point trained a home town apprentice who didn't share their name. In other words, the majority of the largest recruiters were unlikely to use provincial connections to find suitable apprentices. Some masters with large numbers of apprentices had several from their home town, but fewer than ten percent of masters ever trained a non-relative from their place of origin. Of those training at least one non-relative from their place of origin, only 12 percent took on more than two from home.<sup>36</sup>

#### *Geography and local connections: county networks*

Many apprentices came from smaller places, and could not have had a master from their hometown even had they wanted to. If these people were using local information flows then it is likely that they would be apprenticed to someone from the same county. Similarly, even would-be apprentices from places that had produced London masters in the previous generation might not find a master from their hometown in the relevant trade. In both cases our "same town test" may be too severe. If local information flows were important, we might expect to find that these people were apprenticed to someone from

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<sup>36</sup> Ideally we would like to compare the figures in Table 2 to the proportion of apprentices who could have been bound to a home town master. We do not know the full distribution of place of origin for London masters, as only a minority of masters' origins are known.

their county even if that person was not from their hometown. We investigate this possibility in table 3.

The figures are somewhat larger than the “home town” shares in Table 2, with 19% of apprentices having masters with a different name from the same county. This suggests that there was an observable degree of home bias in the hiring of apprentices, as no county contributed 14.5% of the total number of masters. As before, the figures in Table 3 are an upper bound on geographical links between apprentices and masters, to the extent to which they include maternal and other kin links between people of different names. Over 80 percent of migrant apprentices were indentured to masters from a county other than their own. These figures strongly suggests that county networks were relatively unimportant in channelling apprentices to prospective masters; there is little evidence to suggest that possibilities for migrant apprentices were limited in any way by the presence of absence of home county masters in particular companies.

The evidence on town and county links above is calculated on the basis of one hundred and fifty years’ worth of pooled data. It is possible that the importance of geographical connections changed over time. For example, if a network of intermediaries between prospective apprentices and masters was more developed in 1750 than in 1600, we would expect to see a decline in the share of home county recruitment over time. In Figure 3, we plot a moving average of the proportion of migrant apprentices who were indentured to a home county master over the period. The share of home county apprentices is fairly constant, remaining below 20 percent throughout the period. This suggests that county links between masters and apprentices were uncommon throughout the premodern period; there is no evidence, of deficiencies in the earlier period leading to greater use of local networks or knowledge.<sup>37</sup>

### *Parental background and apprenticeship*

Kin and geographic connections do not appear to have been crucial in enabling youths to enter London apprenticeships. It is possible, however, that opportunities to acquire craft skills were circumscribed by the family economy. In one sense this was almost certainly true: apprenticeships were expensive, and only boys from well –off families could

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<sup>37</sup> Until the 1720s, the majority of apprentices bound to masters not from London came from provincial counties other than the master’s home county.

finance premiums and forego up to seven years' worth of income to receive training. Access to apprenticeship may have been further limited by the occupational background of the apprentice's family. In particular, it may have been easier for the children of men with craft skills or mercantile experience to find a suitable indenture. Masters may have been more confident in indenturing boys with a degree of familiarity with craft skills from their upbringing. It is plausible that masters would view the sons of craftsmen as being more likely to have inherited productive attributes, either through genetic transmission or through the experience of observing craft work from a young age. Craftsmen may have been able to use professional networks, or at least recognition of their skill and status, to place their sons in more suitable apprentice positions than would "outsiders" to the sphere of craft and commercial practices. The apprentice records include detailed information about the occupation of each apprentice's father. We use this information to evaluate the importance of occupational links between apprentices' families and the company they enter in London

Table 4 summarizes father occupations over the period 1600 to 1750. Columns 2 and 3 break out metropolitan apprentices (residing in the city of London or Middlesex County at the time of indenture) and provincial apprentices who had migrated to London from outlying counties.<sup>38</sup>

About 40 percent of apprentices were sons of men employed in manufacturing, distribution, or sales. These are activities more likely to involve craft and commercial connections with London. A larger share (45 percent) were the sons of gentlemen or men in the primary, predominantly agricultural, sector. It is interesting to note the different parental occupation patterns when comparing apprentices of metropolitan and provincial origin. The majority of local apprentices had fathers in manufacturing, distribution, or sales. Among provincial apprentices, gentlemen and the primary sector provide the majority of apprentices. A family background in craft and trading occupations was not uncommon among London apprentices, but among those who moved to London, they were at least as likely to be the sons of yeoman farmers.

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<sup>38</sup> The occupation categories were constructed by matching occupational responses to Wrigley's (19xx) PST codes, which placed into seven categories.



Table 5 further explores the extent of intergenerational continuity between apprentices and their parents. The first row lists the fraction of apprentices for whom the company of their master is identical to the occupation of their father. The next three rows summarize the extent of occupational overlap between father and son across a set of occupational clusters. Moving from the third tier to the first tier, the clusters are larger and more general. For example, apothecaries apprentices are matched with “medical workers, other” in the third tier cluster, with “medical professions” in the second tier, and with professions in the first tier.<sup>39</sup> It is useful to recall the limitations of this exercise: we are matching apprentice company to father occupation – there is a some occupational heterogeneity within companies. We also miss linkages across clusters that may indicate a degree of common activity between father and son.<sup>40</sup>

The results in Table 5 reinforce the view that most apprentices were not simply following in the occupational footsteps of their father. Less than five percent of apprentices were training in a company overlapping with their father’s occupation. We find more father-son overlap when we go to border occupational clusters, but even at the most broad cluster, only about a third of metropolitan apprentices, and less than a quarter of provincial apprentices, were training in an occupation in the same sector as that in which their father worked.

### *Urbanisation, chain migration, and apprenticeship*

We return to the role of information flows with an examination of whether the apprenticeship market was segmented by distance or an urban-rural divide. Provincial cities and towns in England were linked to London by well-established commercial and transportation networks. If the existence of these networks reduced the costs of acquiring information for both apprentices and masters, one might expect that large and medium-sized urban areas would send proportionally more apprentices to London. Chain migration might also be important in the apprentice market, with localities sending numerous apprentices to London in one decade reducing information costs for prospective apprentices in the next decade. Our data allows us to measure the degree of urban bias, and the strength of chain migration in shaping apprenticeship patterns.

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<sup>39</sup> As in Table 4, we use Wrigley’s (19xx) PST codes to classify father occupation and apprentice company. The clusters are based on the subdivisions within Wrigley’s classification scheme.

<sup>40</sup> PATRICK TO PROVIDE EXAMPLE.

We use population information from the Compton Census of 1676 to examine the relationship between apprentice flows and size of place. The Compton Census enumerated religious communicants (right term?) by parish; surviving records have been digitised for over eight hundred parishes in eight English counties.<sup>41</sup> We use information on place of origin in the apprentice database to match apprentices indentured between 1650 and 1675 to each parish present in the Compton Census.

Table 6 compares the proportion of apprentices from parishes of different size with the proportion of population (measured as the number of communicants) by parish size. Most striking in the table is the similarity between apprentice and population shares. Apprentices are somewhat over-represented in parishes with over 1000 communicants, but there are only 23 parishes above this threshold. There is no evidence of a bias towards larger parishes at the lower thresholds for 500 and 250 communicants.

If recruitment networks between London and provincial towns were a major conduit to apprentice migration, one would expect to see evidence of “chain migration” in recruitment patterns over time. One implication of chain migration to London would be that towns that were leading suppliers of apprentices to London in 1600 would supply relatively more apprentices 25, 50, or even 100 years later than towns of similar size that did not establish the first links in the chain at the beginning of the period.<sup>42</sup> Table 7 presents apprentice shares for leading source towns from Leicestershire and Yorkshire. These counties were chosen due to distance from London (approximately 100 miles and 200 miles), and due to the large number of apprentices coming from these counties early in the 17<sup>th</sup> century. The leading suppliers of apprentices to London provided about 20 to 30 percent of all apprentices from the county between 1600 and 1649. This is further evidence to support the view that apprentices were not drawn disproportionately from large market towns that were well-connected to the metropolis. Tracing the towns that were leading suppliers between 1600 and 1649, we find that the share from these towns in Yorkshire rose by 10 percentage points by 1700-1749, while the corresponding share saw little change in Leicestershire. We are able to compare town apprenticeship shares to town population

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<sup>41</sup> The counties covered are Bedfordshire, Cambridgeshire, Derbyshire, Leicestershire, Rutland, Suffolk, Sussex, and Yorkshire. We combine figures for urban areas that contain multiple parishes, such as Leicester.

<sup>42</sup> Baines (1994).

shares for the 1650-1699 interval.<sup>43</sup> For Leicestershire, apprenticeship shares are almost identical to population shares. In Yorkshire, there is evidence that the leading source towns are overrepresented relative to population. Overall, this is at best weak evidence for the importance of chain migration in apprenticeship; Yorkshire towns with the greatest heritage in London apprenticeships were only somewhat more prominent when migration to London was on the decline, and there is no parallel evidence for Leicestershire.

### *Distance and apprentice selection*

Economic theories of migration emphasize the role of costs in shaping migration decisions.<sup>44</sup> The distance that the prospective migrant would have to travel is generally found to be correlated with the cost of migration. Apprentice migrants within England would generally be travelling less than a couple hundred miles, but pre-modern transportation infrastructure meant that most would have had to travel several days to get to London. If regional markets in England were poorly integrated at this time, information would also be expensive to acquire, with news of employment prospects in London transmitted slowly and imperfectly to the provinces. If the reliability of information networks decline with distance, apprentices from distant counties would be less responsive to changing opportunities in London than apprentices from local counties.

Our database does not allow us to analyse the impact of distance on who became an apprentice. We can document, however, the extent to which distance altered the company choices of migrants, and the extent to which they relied on geographical networks. If English markets were poorly integrated, apprentices from distant counties, such as Yorkshire, would be less responsive to changing opportunities in London than apprentices from Middlesex, most of whom could walk to the city on a regular basis to acquire information. A related prediction is that in the presence of migration costs that rise substantially with distance, migrants from distant counties would use home town or home county networks more intensively than apprentices coming from counties near London.

We first analyse the importance of distance by examining the distribution of apprentices across London companies over time. If distance-related migration costs were significant, the expectation is that apprentices originating far from London would be

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<sup>43</sup> Town population data are taken from Clark and Hosking's (1993) estimates from the Compton Census (1676) and DeVries's (1984) estimates for Leicestershire, York, and Leeds in 1650 and 1700.

<sup>44</sup> Baines (1994), Sjaastad (196x).

clustered in occupations where the returns were particularly high, or the cost of acquiring information or entering apprenticeship were low. We calculate Duncan Dissimilarity Indices (DDI) to compare the company distribution of migrant apprentices with those of London origin.<sup>45</sup> Apprentices are distributed across 65 companies, and many counties do not send apprentices to London in each company every year, or even over a period of several decades. We wish to maintain a reasonable sample size for these calculations to ensure that integer constraints do not prevent the migrant sample from matching the London sample. As in the previous section, we look at relative company distributions of the two distant counties that send the highest numbers of apprentices: Leicestershire and Yorkshire. We also limit the analysis to the 1625 to 1700. Over this interval, the distribution of companies is relatively unaffected by institutional change, and the emergence of new companies. It is also the period in which we have the most data. To gain a sense as to how the relative company distributions change over time, we have calculated 25 year rolling DDI scores that compare Yorkshire and Leicestershire to London.<sup>46</sup> We also compare the distribution of Middlesex apprentices to London apprentices. Distance should not have affected company choice for Middlesex apprentices; the variation between London and Middlesex can be seen as a reasonable measure of the natural variation in company choice within the metropolitan population.<sup>47</sup>

Figure 5 presents relative to London rolling DDI scores for Yorkshire, Leicestershire, and Middlesex. The figure shows that the choices of apprentices from Yorkshire were more similar to those of apprentices from London than were the choices of apprentices from Middlesex, and that the choices of both groups were more similar to those of Londoners than were the choices of those from Leicestershire. The average DDI scores for Yorkshire, Middlesex and Leicestershire are 24, 27 and 33. This measure makes it clear that conditions were such that would-be apprentices from Yorkshire were able to make choices approximating those of London-born apprentices. Furthermore, the average values show

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<sup>45</sup> The DDI is equal to  $0.5 \times \sum_i \left| \frac{C_i}{\sum C_i} - \frac{L_i}{\sum L_i} \right|$ , where  $C_i$  is the number of apprentices in company  $i$  in the

county, and  $L_i$  is the number of apprentices in company  $i$  in London. If two distributions are identical, the DDI will take the value zero. If the two distributions are orthogonal, DDI will be equal to 100.

<sup>46</sup> The 25-year window means that data from 1613 to 1712 are used in our calculations.

<sup>47</sup> If we randomly divided the London apprentice population into 2 groups, we would not expect the DDI to be zero. As both counties were fully integrated into the metropolitan labour market, comparing London to Middlesex should approximate this sort of split.

that the additional dissimilarity of Leicestershire over London compared with that of Middlesex over London (6) is smaller than the difference between Middlesex and London itself (27). This again suggests that those growing up in Leicestershire were over-represented in particular companies. The fact that Yorkshire, the furthest county from London, has the lowest DDI score of the three counties suggests that distance was no barrier to accessing the entire range of apprenticeship opportunities in this period.

Alternatively, greater migration costs due to distance may have pushed apprentices from more remote counties into signing relatively more indentures with home county masters, with whom both parties can exchange information at relatively low cost. We investigate this possibility in Figure 4, which plots the propensity to be apprenticed to a home county master against county distance to London.<sup>48</sup> This figure uses observations constructed for three intervals for each county: 1600 to 1649, 1650 to 1699, and 1700 to 1749. The labels 1, 2, and 3 identify these three intervals. There is no discernible relationship between the share of home county masters and distance from London.<sup>49</sup> This pattern holds within the three 50-year sub periods. Taken as a whole, there is no compelling evidence that apprentices arriving from more distant parts of England were constrained in their choice of company or master.

## Conclusion

The capacity of a society to enable geographical, occupational and social mobility - and the matching of ability to opportunity that this facilitates – have obvious implications for economic development. Where barriers exist that prevent people exploiting their talents, societies as well as individuals will suffer. Apprenticeship was a major avenue for skill formation in premodern England. The market for the recruitment and training of apprentices has, however, been characterised as being constrained by barriers to mobility arising due to the nature of premodern society – reliance on kin and communal networks, and poor information flows between the metropolis and the provinces.

Our analysis of an extensive database of premodern apprenticeship records shows little evidence of “immutable order” in the recruitment process. Apprentices were drawn

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<sup>48</sup> Distance to London is taken as the straight line distance from the county town to London.

<sup>49</sup> An OLS regression of home country share against distance to London multiplied by 100 yields a coefficient of 0.01, with a t-statistic of 0.23. Separate regressions for the three sub-periods yield similarly small and insignificant coefficients.

widely from all parts of England, and were more likely to migrate long distances in 1600 than in 1750. The typical London apprentice between 1600 and 1750 does not appear to have used the social networks emphasized in the qualitative literature. Less than ten percent of apprentices were indentured to a master who was kin or from their place of origin. Less than twenty percent were matched to a master from their home county. These figures indicate a certain amount of kin and home bias, but confirm this bias is small. Parental connections to the London trades do not appear critical to gain training. Metropolitan apprentices were likely to be the sons of men in manufacturing and distribution activities, but migrant apprentices were most often the sons of agriculturalists. The sectoral overall between fathers and sons is in the order of 30 to 45 percent, but remarkably few apprentices were training in company linked to their father's occupation – perhaps ten percent of metropolitan apprentices, and five percent of migrants.

Other findings support the view that information flows about opportunities in London were able to penetrate distant regions in provincial England. Large urban centres, with established commercial connections to the capital and other provincial cities, were somewhat overrepresented as apprentice sources, but the typical apprentice did not come from a large market town, or from a community that had long-running established connections to London. We find no evidence that apprentices from distant counties were more likely to sign indentures with masters from their home county, or that apprentices from distant counties were more concentrated in a subset of London companies. The company profile of Yorkshire apprentices was more similar to that of Londoners than the profile of Middlesex apprentices.

We conclude that the ability to make contracts over long distances was remarkably well-developed even as early as 1600, and plausibly well before then. It is worth commenting briefly about the institutions that allowed such transactions to take place. It is certainly not the case that apprenticeships were advertised widely in the modern sense. Although newspapers existed, and became increasingly common in the 18th century, even then only a tiny proportion of apprenticeships were advertised. Rather, knowledge of apprenticeships spread through informal channels. We know that would-be apprentices did not travel to London until they had arranged their apprenticeship. We have found that, by and large, apprentices were not bound to people whom they were related, or to people that they knew. There must, therefore, have been a mechanism by which the would-be

apprentice and their family found a master that they did not know in a city far from where they lived. Evidence for how this happened is not extensive. It appears most likely that would-be apprentices and their family used friends, acquaintances and kin in London to find a master. Their London resident relative or friend would then seek out a master that they knew, or that they knew all, but to whom they had no particularly deep relationship. Fragmentary records suggest such a pattern. Thus we find, for example, that Bartholomew Adsworth's apprenticeship to Mr Walton was arranged by his London-resident cousin, George Fox,<sup>50</sup> and that George Long of Ludlow arranged for his friends to make a 'diligent enquiry' for a 'fit person' for his son to serve.<sup>51</sup> In both cases the agent was known to the family, but the master was not, nor is there evidence of a close relationship between master and agent.

Our findings revise understanding of apprenticeship in premodern England. The cost of acquiring training meant that becoming an apprentice was a choice available primarily to the sons of the wealthy and the premodern middle classes. Within this income band, however, there is little evidence that social networks were particularly important. Apprenticeship was not rationed and reserved for the sons of the commercial and mercantile elites. Rather, well-to-do families of all types were able to use apprenticeship to diversify the skill base present in the family economy. This pattern implies larger spillovers and greater social returns to skill formation than would be the case were apprenticeship dynastic in nature.

Our findings also revise understanding of the functioning of premodern economy and society. We have found strong evidence of horizontal economic and social mobility in the period 1600 to 1750. Apprenticeship in this period did not allow many youths to escape poverty. It would appear, however, that apprenticeship did allow families some capital to exercise fairly wide choice over the future economic activities of their children. The preponderance of non-networked apprentice recruitment suggests that these families were able to match aptitude to opportunity to a much greater degree than in an economy where personal connections offer tight constraints to training and employment opportunities. In this sense, the premodern apprenticeship market looks much like what we would expect of a modern recruitment market. Indeed, there is some evidence to suggest that entry into

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<sup>50</sup> LMA, MC6/500A

<sup>51</sup> CLA/024/07/81

modern labour markets is *more* constrained than what we observe in England between 1600 and 1750. A recent study by Corak (20xx) finds that approximately 40 percent of young men in Canada have their first job in the firm that employs their father. It is difficult to make a clean statistical comparison of this figure to our findings for the subset of the population engaged in a London apprenticeship, but it is interesting to note nonetheless that 40 percent exceeds most of the rates of intergenerational continuity we report in Tables 6 and 7.

Finally, it is worth briefly considering our findings on apprenticeship in the context of industrialisation and economic transformation that takes place in England from the end of the eighteenth century. London apprenticeship was not a cornerstone of the English industrial economy; the patterns in figure 2 suggest that the emergence of Northern industrial centres reduced flows into metropolitan apprenticeship. It is clear, however, that one major market in England, and one which was particularly important for the transmission of human capital, was fluid and relatively unconstrained by segmented information as early as 1600. Apprentices were able to match aptitudes to opportunities better than much of the existing literature would suggest. Craft skills were able to diffuse widely through the English economy, with families and communities well away from the main training and trading centres establishing connections to the London trades. The fact that such a fluid, well-integrated market for recruitment and training was in place before the Industrial Revolution may have facilitated other information flows necessary for economic transformation from 1750 onwards. Alternatively, if apprentice markets were as open and well-functioning as we find, it is plausible that other markets more directly linked to industrial development may also have been well developed. English apprenticeship may have been typical or exceptional: an exciting avenue for future scholarship will be to compare our findings to the apprenticeship market in continental Europe.



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Table 1: Was a kinship relation between master and apprentice common, 1600-1750?

	(1)	(2)	(3)	(4)	(5)
Number of apprentices taken by master in his career	% of apprentices recorded as being kin to their master	% of apprentices recorded as being kin to their master, London apprentices	% of masters recorded as having at least one kin apprentice	% unusual name apprentices with same name as their master	% unusual name masters with same name as one of their apprentices
1	0.9	4.4	0.9	10.5	10.5
2	0.5	2.3	1.0	10.7	18.8
3	0.5	2.6	1.3	5.1	14.7
4	0.6	2.6	1.6	6.1	19.0
5	0.4	2.3	1.8	7.9	32.3
6 to 9	0.3	1.4	1.7	4.2	24.7
10 to 20	0.2	1.4	2.0	4.2	37.8
More than 20	0.3	2.4	6.7	No observations	No observations
All Masters	0.5	2.3	1.2	6.9	16.3
N	35838	3185	12,320	1,726	649

Notes: from matched sample where apprentice and master origins are known. Column 3 includes some apprentices who do not share a name with their master.

Table 2: Did masters and apprentices come from the same town?

Number of apprentices taken by masters	All names		Excluding apprentices with same name as master	
	% of apprentices with a home town master	% of masters with one or more home town apprentice	% of apprentices with a home town master	% of masters with one or more home town apprentice
1	12.7	12.7	6.0	6.0
2	11.4	17.4	6.5	9.5
3	8.3	17.8	4.6	9.5
4	7.8	20.7	4.7	12.0
5	7.6	21.8	4.9	13.2
6 to 9	6.5	26.2	4.1	15.8
10 to 20	4.3	27.8	3.0	18.4
More than 20	5.6	50.0	4.7	37.5
All Masters	8.0	18.2	4.7	10.3
N	22,079	8,716	21,259	8,314

Notes: from matched sample where apprentice and master origins are known. Masters from London and Middlesex are excluded. Data apply to 1600-1750

Table 3: Did masters and apprentices come from the same county?

Number of apprentices taken by masters	All names		Excluding apprentices with same name as Master	
	% of apprentices with home county master	% of masters with one or more home county apprentice	% of apprentices with home county master	% masters with one or more home county apprentice
1	29.3	29.3	22.1	22.1
2	27.3	38.4	21.9	30.0
3	23.8	42.5	19.4	33.6
4	23.1	50.2	19.5	42.5
5	23.0	55.2	19.9	46.1
6 to 9	21.1	58.3	18.2	52.2
10 to 20	17.1	68.4	14.9	62.3
More than 20	13.8	79.2	12.7	79.2
All	23.0	42.3	19.0	35.1
N	22,679	8,716	21,259	8,314

Notes: from 1600-1749 matched sample where apprentice and master origins are known. London and Middlesex masters excluded. Data apply to 1600-1750

Table 4: Father occupation categories, 1600-1750

	All apprentices	Metropolitan Apprentices	Provincial Apprentices
Father primary	30	11	36
Father manufacturing	33	45	29
Father distribution/sales	7	10	6
Father labourer	3	5	2
Father service	7	14	5
Father professional	5	3	5
Father gentleman	15	12	16
N	110881	28127	82684

Table 5: Intergenerational continuity, 1600-1750

	All apprentices	Metropolitan Apprentices	Provincial Apprentices
Father in same company	3.8	5.8	3.1
Father in same third tier cluster	4.5	6.3	3.9
Father in same second tier cluster	6.7	9.6	5.7
Father in same first tier cluster	26.5	35.2	23.5
N	110881	28127	82684



Table 6: Did large places send disproportionately more apprentices than smaller places?

	Share of apprentices, 1650-1675	Share of population, 1676
Parishes $\geq 1000$ enumerated (N=23)	34%	25%
Parishes $\geq 500$ enumerated (N=71)	41%	39%
Parishes $\geq 250$ enumerated (N=208)	61%	62%
Total (N=857)	1,508	204,439

Table 7: Apprentice concentration, 1600-1750

	1600-1649	1650-	1700-1749
Yorkshire			
Total apprentices	1422	1500	730
Apprentice %, top 10 towns, 1600-1649	19	24	29
Population %, top 10 towns, 1600-1649		13	
Leicestershire			
Total apprentices	1313	1742	587
Apprentice %, top 10 towns, 1600-1649	28	24	27
Population %, top 10 towns, 1600-1649		24	

Notes: the top 10 towns for Yorkshire, 1600-49, are York, Wakefield, Pontefract, Leeds, Halifax, Doncaster, Rotherham, Sheffield, Richmond, and Ripon. The top 10 towns for Leicestershire, 1600-49 are Leicester, Loughborough, Melton Mowbray, Sheepshead, Mountsorrel, Harborough, Hinckley, Lubenham, Wigston, Ashby de la Zouch, and Wymeswold. .

Figure 1: The number of London apprentices recorded in the data over time

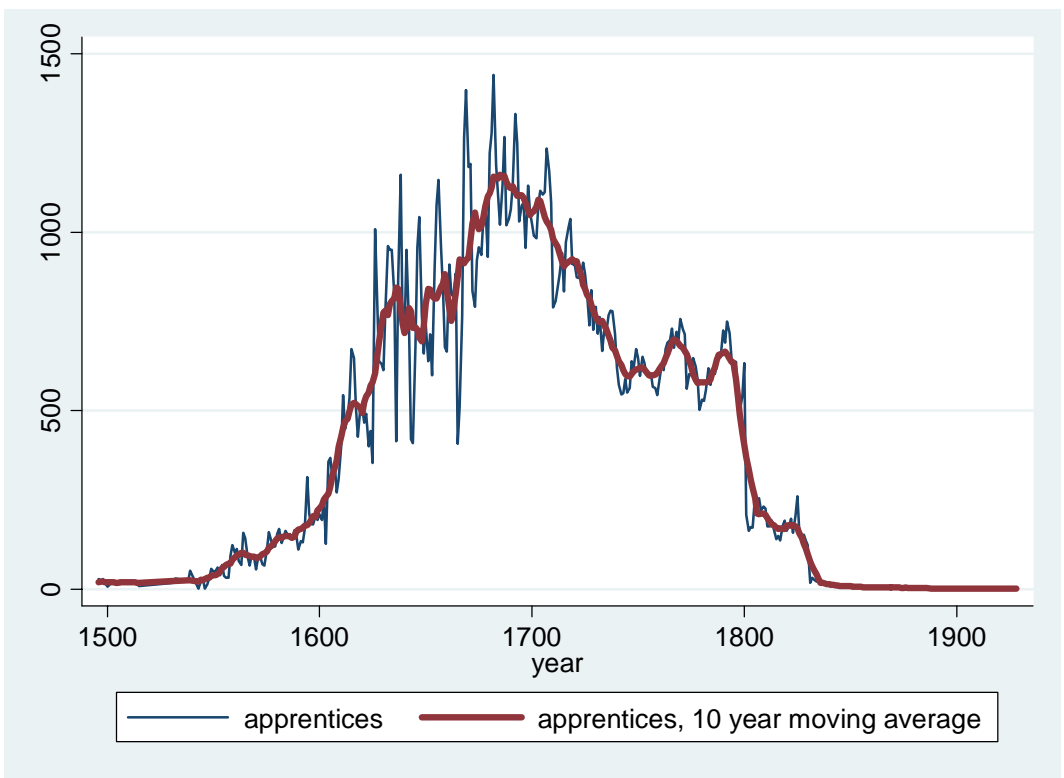


Figure 2 a,b,c: Apprenticeship rates over time per head of population: 1600-1625, 1700-1725 and 1750-1775

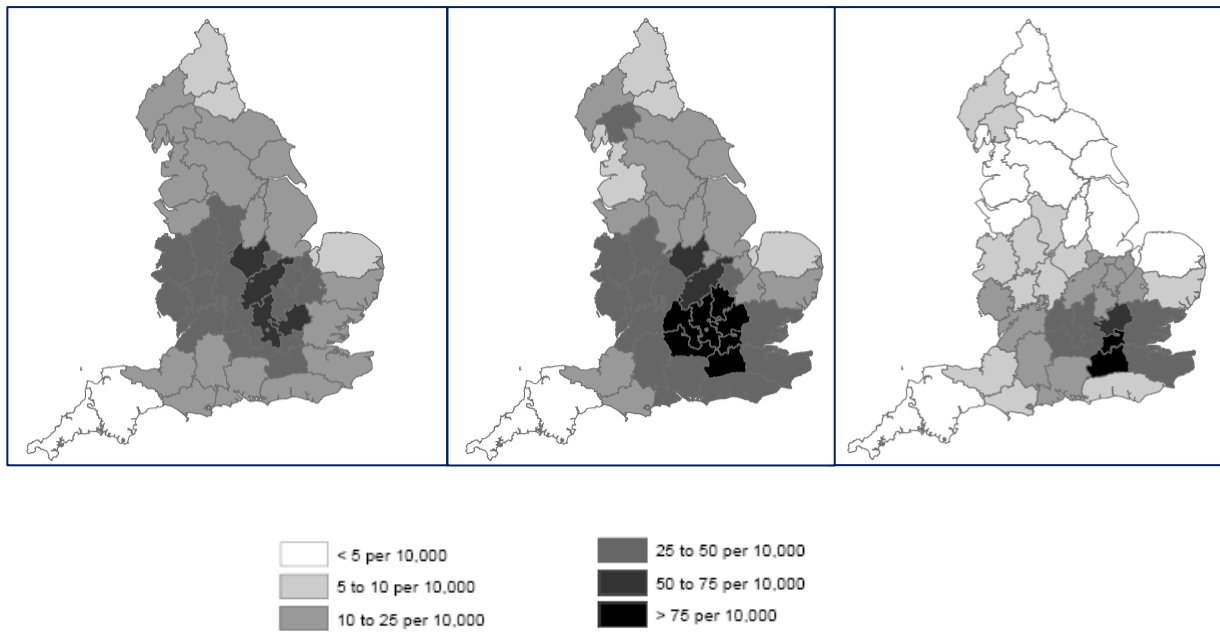


Figure 3: The proportion of apprentices apprenticed to a master from their home county over time (London and Middlesex masters excluded)

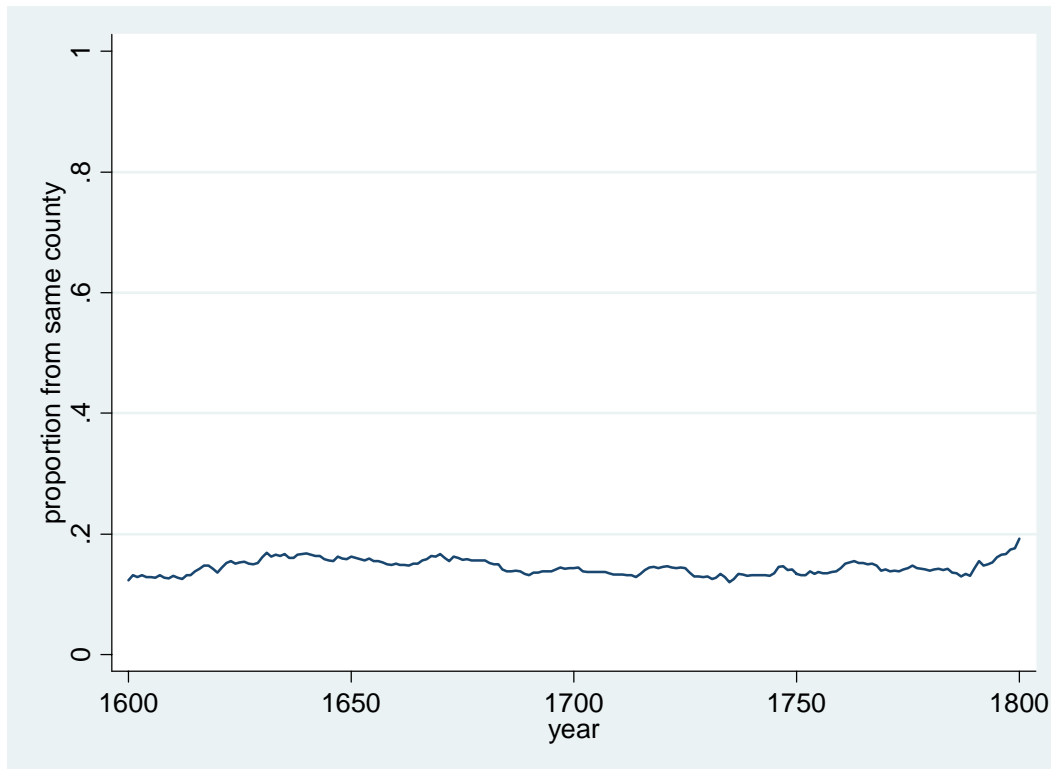
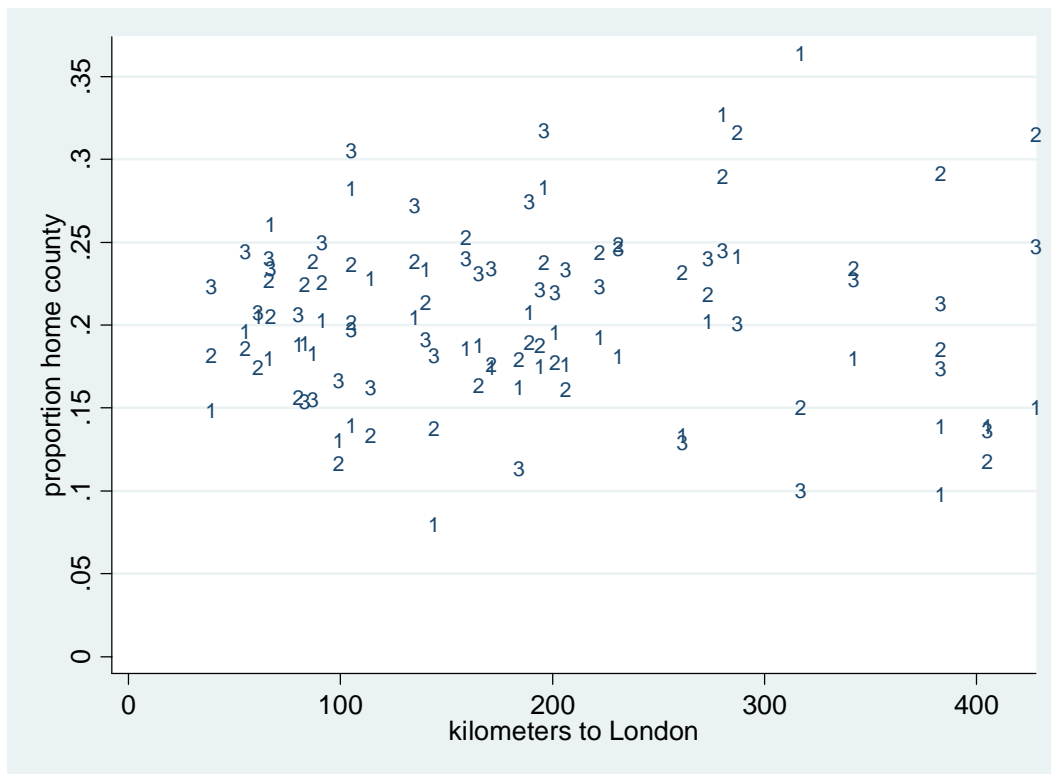


Figure 4: Propensity to be apprenticed to a master from your home county against distance



**Notes:** observations are county level values over 50 year intervals (1600-1649, 1650-1699, 1700-1749). There are three observations for each county, with London, Middlesex, and Surrey excluded. The label 1 indicates an observation for 1600-49, 2 is an observation for 1650-99, and 3 is an observation for 1700-49. Distance is measured as the straight line distance between London and each county town.

Figure 5: DDI scores for Leicestershire, Middlesex and Yorkshire, 1625-1700

