Patrick Wallis

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Author(s): S. R. Epstein
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Craft Guilds, Apprenticeship, and Technological Change in Preindustrial Europe

S. R. EPSTEIN

This article argues that medieval craft guilds emerged in order to provide transferable skills through apprenticeship. They prospered for more than half a millennium because they sustained interregional specialized labor markets and contributed to technological invention by stimulating technical diffusion through migrant labor and by providing inventors with temporary monopoly rents. They played a leading role in preindustrial manufacture because their main competitor, rural putting out, was a net consumer rather than producer of technological innovation. They finally disappeared not through adaptive failure but because national states abolished them by decree.

Technological invention and innovation in the preindustrial economy are still poorly understood. This is partly because of the difficulty in identifying the small-scale and anonymous innovations that dominated technical progress at the time. However, the problem is compounded by several long-standing assumptions about premodern manufacture, in particular by the view that from the fifteenth century onwards craft guilds—which provided European urban manufacture with its main institutional framework for over 600 years—were organized rent-seekers that systematically opposed technical innovation.

This article suggests that the prevailing view of craft guilds misrepresents their principal function and their technological consequences. It begins by analyzing the guild structure from the point of view of individual producers and suggests that the primary purpose of craft guilds was to provide adequate skills training through formal apprenticeship. It then argues, from evidence of innovation and resistance to it, that technological invention and innovation were a significant, albeit mostly unintended effect of the crafts' support for investment in skills. It concludes by briefly addressing the counterfactual question implied by the guilds' critics: if craft guilds were technologically regressive, why was guild-based craft production not out-competed by its major contemporary rival, rural protoindustry?

Rather than provide a detailed study of an individual craft or of a constellation of guilds in one town, the focus will be on the broad outlines of a sys-

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S. R. Epstein is Reader in Economic History at the London School of Economics and Political Science, London WC2A 2AE.

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purpose of searches was to enforce technical standards to maintain reputation in outside markets, since controls of this kind were made in any case by the guild officers or the merchants who sealed the goods for export, and craftsmen resented searches that could breach their trade secrets. For all these reasons, searches were rather unusual.[41] Where they did apply, they are better understood as a symbolic means of reassuring the poorer craftsmen who had the most to loose from technological innovation, while also maintaining the artisans' assent to the corporate hierarchy.[42]

On the other hand, technological innovation was not easily controlled. Technical infringements were far harder to monitor than the use of illegal workers because guild "searchers" could only establish deviations from stipulated standards by observing the final product. It was therefore possible to introduce process innovations without incurring sanctions.[43] Craft guilds seem in any case to have accepted the existence of competing processes and techniques—an attitude that the mercantilist policies of governments and town administrations reinforced, as we shall see later. Thus, the standard oath sworn by an early modern London apprentice stipulated that he "his said master faithfully his *secrets* keep."[44] Even on the evidence of guild statutes, which exaggerate craft conservatism, statutory technical restrictions seem to have declined after the later Middle Ages, suggesting that innovation was becoming more accepted in the face of expanding markets and competition.[45]

The claim that guilds tended spontaneously to oppose outside innovations is also problematic. One reason is that it is excessively generic. If it is meant to say that guilds never innovated, it is demonstrably false; if it is meant to say that guilds would at some point become technically conservative, it loses any predictive value. The argument is also methodologically naive. Al-

[41] For the reputational purposes of searches, see Richardson, "Brand Names." For the incidence of searches see Thrupp, "Gilds," p. 256; Lipson, *Economic History*, vol. 3, pp. 335, 340, 343; Ward, *Metropolitan Communities*, pp. 126–43; and Deceulaer, "Guilds," pp. 178–79. For strong resistance to searches see ibid., p. 178 and fn. 25. A major purpose of searches was to verify the quality and status of apprentices, and in England this seems to have become their main function from the late seventeenth century (Berlin, "Broken," p. 86).

[42] Ibid., p. 83.

[43] The difficulty in monitoring the manufacturing process explains why guild demarcations were based on product, not process (Marshall, "Capitalism," p. 24). For similar reasons, guilds never specified the content of apprentices' teaching, since their proficiency could only be evaluated *ex post*.

[44] Rappaport, *Worlds*, p. 234; my emphasis. Searchers from the guild of gold and silver wire-drawers in seventeenth-century London agreed to keep officers who were also potential competitors out of a member's work room because he feared losing his trade secrets (Berlin, "Broken," p. 82). In the Venetian glass industry, craftsmen recorded their technical innovations in secret "recipe books," several hundreds of which survive (Trivellato, "Was Technology"). In 1574 the town council of Memmingen interviewed four linen masters on the techniques of bleaching, revealing extreme variation in what were closely guarded secrets (Safley, "Production," pp. 130–31). See also below, notes 76–79.

[45] For a systematic analysis of this point for early modern Italy, whose guilds are claimed to have been particularly conservative, see Lanaro, "Statuti." See also Hatcher and Barker, *History*, pp. 142–44.

cumvent guild regulations. On the other hand, city councils were more willing to meet the small masters' concerns if labor-saving innovations coincided with a serious economic downturn, both to ensure social and political stability and to restrain unemployed craftsmen from leaving the town.[52] In other words, guilds were most likely to act as "recession cartels" when economic circumstances took a turn for the worse, but they still required political support to enforce cartel restrictions successfully against free riders and competing guilds. Thus, Dutch guilds began to resort systematically to restrictive policies when the country entered a long phase of stagnation after the mid-seventeenth century—but only after obtaining municipal approval.[53]

Relations between guilds and the state could also influence innovation in the opposite direction. In Ancien Regime France, for example, rather than the craft guilds it was frequently the state, in alliance with local political and mercantile elites, which developed the vast system of quality regulation over exported goods decried by economic historians. Moreover, following a pattern that we shall see at work also in Venice and Milan, it was frequently an alliance between the mercantilist state and the great merchants that actually stifled artisan innovation aimed at lowering costs. Thus, the invention of a new silk loom in seventeenth-century Lyon was rejected not by the local silk guild (which did not exist at this time), but by the Italian importers of manufactured silk who put pressure on their clients to oppose it. In 1728, new machinery similar to the gig-mill devised by artisans in Languedoc was destroyed by the state cloth inspectors; in 1732, the latter opposed a device "remarkably similar to the flying shuttle, 'invented' one year later in England."[54]

Since the consequences of both internal and external factors were defined by institutional, social, and economic conditions that were mostly beyond the guilds' control, the latter's response to technological change varied considerably with circumstances. Here we can usefully distinguish between "one-off" and systemic protectionism. One-off protectionism by individual guilds did occur, although the records inflate both its incidence (crackpot inventors were never in short supply) and its effects (what one guild refused another was likely to adopt).[55] By contrast, systemic protectionism was the effect of

[52] A Venetian decree of 1631 attempted to recall forty glassmakers of Murano who had fled the city during the plague of 1630–1631 (Francesca Trivellato, personal communication).

[53] de Vries and van der Woude, *First Modern Economy*, pp. 294 (for the silk industry), 340–41, 582; and Unger, *Dutch Shipbuilding*, chap.5. Deceulaer, "Guilds," pp. 194–95, 197 also finds that litigation in Antwerp increased at times of economic contraction. However, there is little hard evidence that technological obstruction increased significantly as a consequence of economic stagnation; see Davids, "Shifts," pp. 349–53.

[54] See Heller, *Labour*, pp. 180–81 for Lyon; Thompson, *Clermont*, pp. 336–37 for Languedoc. See also above, note 23.

[55] Florence's first recorded patent was awarded in 1421 to Filippo Brunelleschi for a revolutionary new ship that would haul loads more cheaply to the city. The machine was "a technical fiasco that

DID CRAFTS INNOVATE?

Craft innovation was the outcome of small-scale and incremental practical experiment and of random variation.[58] Crafts had no wish to publicize innovation; most guild "secrets" appear in the records only after they had been illicitly transferred. Inasmuch as corporate supervision had any effect, it tried to ensure that an individual's discovery was kept within the guild membership. Because craft innovation is less apparent than outright opposition, identifying the origins of an innovation (as distinct from its purveyors) is rather like finding the inventor of a joke. Jokes typically have no author.[59]

Even so, evidence of anonymous improvements within guilds is readily available, although their impact is hard to quantify. In a rare estimate of the gains from craft innovation, Walter Endrei has suggested that labor productivity in the high-quality woollen industry under guild control increased by about 240 percent between the late thirteenth and the seventeenth centuries; productivity gains in weaving were over 300 percent. Gains in labor productivity of the order of 750 percent were achieved in the heavily gilded book industry in Lyon between c.1500 and 1572; but the precise manner by which this was done is unknown. Harder to quantify but equally significant gains in the volume and sophistication of production of that most intellectually demanding machine, the mechanical clock, occurred after it became organized in formal crafts in early sixteenth-century south Germany.[60] Further references to equally nameless improvements, including instances of deliberate experimentation, are found scattered across the literature.[61]

[58] Discussing the possibility that God's mind was *not* perfect and had therefore not created the best of all possible worlds, David Hume came up with the following description of preindustrial technological change as a stochastic process: "If we survey a ship, what an exalted idea must we form of the ingenuity of the carpenter, who framed so complicated useful and beautiful a machine? And what surprise must we entertain, when we find him [God] a stupid mechanic, who imitated others, and copied an art, which, through a long succession of ages, after multiplied trials, mistakes, corrections, deliberations, and controversies, had been gradually improving? Many worlds might have been botched and bungled, throughout an eternity, ere this system was struck out: Much labor lost: Many fruitless trials made; And a slow, but continued improvement carried on during infinite ages in the art of world-making" (*Dialogues*, p. 77).

[59] Epstein, *Wage Labor*, p. 140. Dennet, *Darwin's Dangerous Idea*, p. 99, draws an analogy between speciation and the invention and transmission of jokes, but his point applies equally well to preindustrial technology. On patents and guilds, see MacLeod, *Inventing*, p. 83. For guild "secrets" see notes 44, 76–79.

[60] Endrei, "Changements"; Zemon Davis, "Trade Union," p. 53 fn. 3; and Mayr, *Authority*, pp. 8–9.

[61] Wire-makers in Nürnberg, who experimented from 1390 on the invention of automatic machines, devised a wire-drawing bench operated by water power around 1410 (Ashtor, "Factors," p. 33); Murano glassmakers kept secret recipe books with experimental data (Trivellato, "Was Technology"). For innovations see Endrei, "Rouet", pp. 74, 79 (pedal-actioned loom in late eleventh-century Flanders; spinning wheel in Tortosa in the 1450s); Irigoin, "Origines" (rag paper invented in late thirteenth-century Fabriano); Hirshler, "Medieval Economic Competition," p. 55 (a new wheel combining the twisting and spinning of silk yarn in Cologne, 1397); de Vries and van der Woude, *First Modern Economy*, p. 276 (innovations by Dutch beer brewers in the late fifteenth and early sixteenth centuries); Malanima,

of protoindustry's lack of formal training and the dispersed character of production, which substantially raised monitoring costs, it seems to have been technologically sluggish and to have delivered little endogenous innovation.[80] Moreover, rural industry found it difficult to incorporate exogenous innovation without undergoing structural change. Because major technical change caused either labor skilling or capital intensification, protoindustry displayed a tendency to move either "back" into craft production, "forwards" into factory industrialism, or "sideways" into sweatshops.[81] Comparison with its organizational competitors therefore suggests that it was the technological edge provided by institutionalized apprenticeship, by its associated specialized labor markets, and by the quasi-monopoly rents over innovation that underpinned the craft guild's long-term survival. For centuries, alternative arrangements were out-competed, restricted to low-skill manufactures like protoindustry, or forced to inhabit institutional niches like centralized manufactories.[82]

[80] See Sokoloff and Dollar, "Agricultural Seasonality," pp. 316–17, for a recent restatement of this point. The argument cannot easily be tested, because urban craftsmen and rural cottagers tended to engage in different activities. However, it would seem that whereas craft innovations were adopted by rural manufactures, the opposite was unlikely to occur. In Holland, the transfer after 1600 of the shipbuilding industry from the towns to the rural Zaan region was followed by a "striking" decline in technological innovation (de Vries and van der Woude, *First Modern Economy*, pp. 297–98). The example suggests that the static gains of rural production in terms of cost were offset by a loss in dynamic gains from urban innovation. But urban technology did not always flow very swiftly to the countryside. The Dutch loom, patented in Holland in 1604 and recorded in London around 1614, was adopted by the Lancashire cloth industry only at the beginning of the following century (Walton, *Lancashire*, p. 64).

[81] On the incorporation of new technology see Coleman, "Textile Growth"; MacLeod, *Inventing*, p. 102; Magnusson, "From *Verlag*," p. 202; Gullickson, "Agriculture"; Millward, "Emergence," pp. 22–23; Ogilvie, *State Corporatism*, p. 27; and Jones, "Organization," pp. 134–35. On structural change see Liu, *Weaver's Knot*; Randall, *Before the Luddites*, chaps.1–3; Hudson, *Genesis*; Ogilvie and Cerman, *European Proto-Industrialization*, chaps.4, 5, 9; and Berg, "On the Origins," p. 181.

[82] The preceding argument raises the question why guilds eventually failed. The short answer is that they did not. In every instance they were abolished by a forcible act of legislation (in 1791 in France, in 1835 in England, in 1869 in Germany), and their training functions were taken up by unions, workers' and professional associations, and other public (municipal, regional or state) organizations. Nonetheless, it is clear that traditional forms of guild organization were threatened by the rapid expansion of wage labor and by the shift in numerical balance from skilled to unskilled labor, which significantly increased the enforcement costs of apprenticeship. Thus, in England during the second half of the eighteenth century, even as the absolute number of apprenticed individuals increased they were ever less likely to conclude a full apprenticeship (Snell, *Annals*, pp. 241–43). Apprentices appear to have become more mobile in part because the demand for semiskilled labor was increasing faster than for skilled, and in part because improved means of transport made it harder to restrain the apprentices' opportunism. Because the guilds' narrow territorial jurisdiction restricted their coercive powers, it seems likely that under these new conditions they would have had to fuse into regional or national craft organizations to survive. To do so, however, meant successfully facing down the state. Although the state's attack on the guilds was often justified in economic terms, it is more accurately understood as part of a broader strategy to extend its sovereignty and the associated institutions of citizenship and equality before the law. The guilds, which represented the most deep-rooted and legally quasi-autonomous corporate bodies of the Ancien Régime, posed the main challenge to the modern state's claim to sovereign power; they therefore had to be destroyed. The extinction of the guilds occurred because of the institutional equivalent of an asteroid from outer space. See Black, *Guilds*, chaps.12–14 for the intellectual antecedents and consequences of this process.

_____. "Rouet italien et metier de Flandre à tisser au large." In *Tecnica e società nell'Italia dei secoli XII–XVI*, 71–81. Pistoia: Centro Italiano di Studi di Storia e d'Arte, 1987.

Epstein, Steven. *Wage Labor and Guilds in Medieval Europe.* Chapel Hill and London: University of North Carolina Press, 1991.

Epstein, S. R. "Cities, Regions and the Late Medieval Crisis: Sicily and Tuscany Compared." *Past and Present* 130 (1991): 3–50.

_____. "Regional Fairs, Institutional Innovation and Economic Growth in Late Medieval Europe." *Economic History Review* 2d. ser. 47, no. 3 (1994): 459–82.

Esser, Raingard. "Germans in Early Modern Britain." In *Germans in Britain Since 1500,* edited by P. Panayi, 17–27. London: Hambledon, 1996.

Farr, James R. *Hands of Honor. Artisans and Their World in Dijon, 1550–1650.* Ithaca and London: Cornell University Press, 1988.

_____. "On the Shop Floor: Guilds, Artisans, and the European Market Economy, 1350–1750." *Journal of Early Modern History* 1, no.1 (1997): 24–54.

Fennell Mazzaoui, Maureen. "Artisan Migration and Technology in the Italian Textile Industry in the Late Middle Ages (1100–1500)." In *Strutture familiari epidemie migrazioni nell'Italia medievale,* edited by Rinaldo Comba, Gabriella Piccinni and Giuliano Pinto, 519–34. Naples: Edizioni Scientifiche Italiane, 1984.

Friedrichs, Christopher R. *The Early Modern City 1450–1750.* London: Longmans, 1995.

Gay Davies, M. *The Enforcement of English Apprenticeship 1563–1642.* Cambridge, MA: Harvard University Press, 1956.

Griffiths, T., P. A. Hunt, and P. K. O'Brien. "Inventive Activity in the British Textile Industry, 1700–1800." this JOURNAL 52, no. 4 (1992): 881–906.

Gullickson, Gay L. "Agriculture and Cottage Industry. Redefining the Causes of Protoindustrialization." this JOURNAL 43, no. 4 (1983): 831–50.

Gustafsson, Bo. "The Rise and Economic Behaviour of Medieval Craft Guilds." In *Power and Economic Institutions,* edited by Bo Gustafsson, 69–106. Aldershot: Edward Elgar, 1991.

Hafter, Daryl M. "The Programmed Brocade Loom and the 'Decline of the Drawgirl'." In *Dynamos and Virgins Revisited: Women and Technological Change in History,* edited by M. M. Trescott, 49–66. Metuchen, NJ: Scarecrow Press, 1979.

Hafter, Daryl M., ed. *European Women and Preindustrial Craft.* Bloomington and Indianapolis: Indiana University Press, 1995.

Harriss, John. "The First British Measures Against Industrial Espionage." In *Industry and Finance in Early Modern History,* edited by I. Blanchard, A. Goodman and J. Newman, 205–26. Stuttgart: F.Steiner, 1992.

Hatcher, John, and T. C.Barker, *A History of British Pewter.* London: Longman, 1974.

Heller, Henry. *Labour, Science and Technology in France, 1500–1620.* Cambridge: Cambridge University Press, 1996.

Hickson, C. R., and E. A.Thompson. "A New Theory of Guilds and European Economic Development." *Explorations in Economic History* 28, no.1 (1991): 127–68.

Hirshler, E. E. "Medieval Economic Competition." this JOURNAL 14, no. 1 (1954): 52–58.

Howell, Martha C. "Achieving the Guild Effect Without Guilds: Crafts and Craftsmen in Late Medieval Douai." In *Les métiers au Moyen Âge,* edited by P. Lambrechts and J.–P. Sosson, 109–28. Publications de l'Institut d'Etudes Médiévales, vol. 15. Louvain-la-Neuve: Université Catholique de Louvain, 1994.

Hudson, Pat. *The Genesis of Industrial Capital. A Study of the West Riding Wool Textile Industry c.1750–1850.* Cambridge: Cambridge University Press, 1986.

Hume, David. *Dialogues Concerning Natural Religion,* edited, with an introduction, by Martin Bell. London: Penguin, 1990.

___. "The New Economic History and the Industrial Revolution." In *The British Industrial Revolution. An Economic Perspective*, edited by Joel Mokyr, 1–131. Oxford and Boulder: Westview Press, 1993.

____. "Urbanization, Technological Progress, and Economic History." In *Urban Agglomeration and Economic Growth*, edited by H.Giersch, 3–34. Berlin and New York: Springer, 1995.

____. "Innovation and Its Enemies: The Economic and Political Roots of Technological Inertia." Mimeo. Northwestern University, 1997.

Ogilvie, Sheilagh C. *State Corporatism and Proto-Industry. The Württemberg Black Forest, 1580–1797.* Cambridge: Cambridge University Press, 1997.

Ogilvie, Sheilagh C., and Marcus Cerman, eds. *European Proto-Industrialization.* Cambridge: Cambridge University Press, 1996.

Olson, Mancur Jr. *The Logic of Collective Action.* Cambridge, MA: Harvard University Press, 1965.

Pagano, Ugo. "Property Rights, Asset Specificity, and the Division of Labor Under Alternative Capitalist Relations." *Cambridge Journal of Economics* 15 (1991): 315–42.

Persson, Karl Gunnar. *Pre-Industrial Economic Growth. Social Organization and Technological Progress in Europe.* Oxford: Blackwell, 1988.

Petty, William, *A Treatise of Taxes and Contributions.* London, 1679.

Pfister, Ulrich. "Craft Guilds and Proto-Industrialization in Europe, 16th to 18th Centuries." In *Guilds, Economy and Society*, edited by S. R. Epstein, H. G. Haupt, Carlo Poni, and Hugo Soly. International Economic History Conference, Madrid, 1998.

Poni, Carlo. "Per la storia del distretto industriale serico di Bologna (secoli XVI–XIX)." *Quaderni storici* 25, no. 1 (1990): 93–167.

Randall, Adrian J. *Before the Luddites. Custom, Community and Machinery in the English Woollen Industry, 1776–1809.* Cambridge: Cambridge University Press, 1991.

Rapp, Richard T. *Industry and Economic Decline in Seventeenth-Century Venice.* Cambridge, MA: Harvard University Press, 1976.

Rappaport, Steve. *Worlds within Worlds: Structures of Life in Sixteenth-Century London.* Cambridge: Cambridge University Press, 1989.

____. "Reconsidering Apprenticeship in Sixteenth-Century London." Mimeo, New York University, 1991.

Reed, C. G. "Transactions Costs and Differential Growth in Seventeenth Century Western Europe." this JOURNAL 33, no. 1 (1973): 177–90.

Reith, Reinhold. "Arbeitsmigration und Technologietransfer in der Habsburgermonarchie in der zweiten Hälfte des 18. Jahrhunderts. Die Gesellenwanderung aus der Sicht der Kommerzienkonsesse." *Blätter für Technikgeschichte* 56 (1994): 9–33.

Richardson, Gary. "Brand Names Before the Industrial Revolution." Mimeo, Berkeley, 1997.

Rothschild, Emma. "Adam Smith, Apprenticeship and Insecurity." Centre for History and Economics Working Paper, King's College, Cambridge, July 1994.

Rule, John. "The Property of Skill in the Age of Manufacture." In *The Historical Meanings of Work*, edited by Patrick Joyce, 99–118. Cambridge: Cambridge University Press, 1987.

Sabel, Charles, and Jonathan Zeitlin. "Historical Alternatives to Mass Production: Politics, Markets and Technology in Nineteenth-Century Industrialization." *Past and Present* 108 (1985): 133–76.

Safley, T. M. "Production, Transaction, and Proletarianization: The Textile Industry in Upper Swabia, 1580–1660." In *The Workplace Before the Factory. Artisans and Proletarians 1500–1800*, edited by T. M. Safley and L. N. Rosenband, 118–45. Ithaca: Cornell University Press, 1993.

Schilling, Heinz. "Innovation Through Migration: The Settlement of the Calvinistic Netherlanders in Sixteenth- and Seventeenth-Century Central and Western Europe." *Histoire sociale* 16 (1983): 7–33.

Scoville, Warren C. "The Huguenots and the Diffusion of Technology." *Journal of Political Economy* 60 (1952): 294–311.

_____. *The Persecution of Huguenots and French Economic Development 1680–1720.* Berkeley and Los Angeles: University of California Press, 1960.

Sella, Domenico. *Italy in the Seventeenth Century.* London and New York: Longman, 1997.

Sewell, William R. Jr. *Work and Revolution in France.* Cambridge: Cambridge University Press, 1980.

Simon, Christian. "Labor Relations at Manufactures in the Eighteenth Century: The Calico Printers in Europe." *International Review of Social History* 39, Supplement (1994): 115–44.

Smith, Adam. *An Inquiry into the Nature and Causes of the Wealth of Nations [1774]*, edited by E. Cannan. Chicago: Chicago University Press, 1974.

Smith, Steven R. "The London Apprentices as Seventeenth-Century Adolescents." *Past and Present* 61 (1973): 149–61.

Snell, K. D. M. *Annals of the Laboring Poor. Social Change and Agrarian England, 1660–1900.* Cambridge: Cambridge University Press, 1985.

Sokoloff, Kenneth L., and David Dollar. "Agricultural Seasonality and the Organization of Manufacturing in Early Industrial Economies: The Contrast Between England and the United States." this JOURNAL 57, no.2 (1997): 288–321.

Sonenscher, Michael. *The Hatters of Eighteenth-Century France.* Berkeley and Los Angeles: University of California Press, 1987.

____. *Work and Wages. Natural Law, Politics and the Eighteenth-Century French Trades.* Cambridge: Cambridge University Press, 1989.

Steinfeld, Robert J. *The Invention of Free Labor. The Employment Relation in English and American Law and Culture, 1350–1870.* Chapel Hill and London: University of North Carolina Press, 1991.

Stevens, Margaret. "A Theoretical Model of On-the-Job Training with Imperfect Competition." *Oxford Economic Papers* 46, no.4 (1994): 537–62.

Swanson, Heather. *Medieval Artisans. An Urban Class in Late Medieval England.* Oxford: Blackwell, 1989.

Thompson, James K.J. *Clermont-de-Lodève 1633–1789. Fluctuations in the Prosperity of a Languedocian Cloth-Making Town.* Cambridge: Cambridge University Press, 1982.

____. "Variations in Industrial Structure in Pre-Industrial Languedoc." In *Manufacture in Town and Country Before the Factory,* edited by Maxine Berg, Pat Hudson and Michael Sonenscher, 61–91. Cambridge: Cambridge University Press, 1983.

Thrupp, Sylvia L. "The Gilds." In *The Cambridge Economic History of Europe.* Vol. 3. *Economic Organization and Policies in the Middle Ages*, edited by M. M. Postan, E. E. Rich and E. Miller, 230–80. Cambridge: Cambridge University Press, 1963.

Trivellato, Francesca. "Was Technology Determinant? The Case of Venetian Glass Manufacture, Late 17th Century – Late 18th Century." Mimeo, University of Venice, 1996.

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Rules and reality: quantifying the practice of apprenticeship in early modern England[1]

By CHRIS MINNS and PATRICK WALLIS*

This article uses recently digitized samples of apprentices and masters in London and Bristol to quantify the practice of apprenticeship in the late seventeenth century. Apprenticeship appears much more fluid than is traditionally understood. Many apprentices did not complete their terms of indenture; late arrival and early departure from the master's household were widespread. Other apprentices appear to have been absent temporarily, returning to the master shortly before the end of their indenture. Regression analysis indicates that the patterns of presence and absence broadly reflect the resources and external opportunities available to apprentices.

The formal structure of early modern apprenticeship was defined by rules established by guilds, cities, and the state. In England, the Statute of Artificers applied London's existing practices nationwide in 1563.[2] While some details were negotiable, the core of English apprenticeship contracts was fixed by law. Apprentices served for at least seven years, working in exchange for instruction: the fruits of their labour belonged to their masters. In corporate cities, contracts had to be registered with guild, city, or both. Apprentices were under the quasi-parental authority of their masters: their manners, entertainment, and freedom to marry were limited. On completion, the apprentice gained significant legal privileges, including settlement for poor relief, and the right to use his trade and take his own apprentices.

To what extent did apprenticeships follow these rules? This question is of fundamental importance to our understanding of apprenticeship. If rules were not enforced and apprentices left early, how did masters recover their training costs? Could apprenticeship still offer stability or serve to socialize youths into urban

* Author Affiliation: Department of Economic History, London School of Economics.

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[2] 5 Eliz. I, c. 4. On rules, see Wallis, 'Apprenticeship', pp. 834–5; Snell, 'Apprenticeship system'; Dunlop and Denman, *English apprenticeship*, pp. 72–93; Davies, *Enforcement*, pp. 1–11. On London's custom, see Hovland, 'Apprenticeship', pp. 151–3. As most English apprentices were male, the generic apprentice is taken here to be male.

life?[3] Which apprentices abandoned their masters and why? As Kaplan suggested, understanding 'success' in apprenticeship requires knowing 'at what point and why . . . an aspiring apprentice abandon[s] the trajectory'.[4] The manner in which apprenticeship operated also has implications for recent arguments about guilds, human capital formation, and premodern economic growth. Epstein, Humphries, and van Zanden have, respectively, argued that by creating human capital apprenticeship contributed to premodern technological change, precocious economic growth in England, and divergence between Europe and Asia.[5] All three point to the contribution of the institutional framework surrounding apprenticeship: in Epstein's words, guilds enforced 'contractual norms that reduced opportunism by masters and apprentices', permitting long-term exchanges of training and labour services.[6] This positive interpretation of guilds' involvement in apprenticeship has not gone unchallenged. Ogilvie argues that guilds instead focused on excluding competition.[7] Nonetheless, while masters may have faced little pressure to meet their obligations, her analysis suggests strong incentives for apprentices to fulfil contracts in order to gain privileges from their completion. Arguing along different lines, Davids suggests Dutch guilds played little role in apprenticeship, implying that contract enforcement depended on individuals.[8]

Although one recent survey of European apprenticeship concluded that 'the overwhelming majority of the apprentices *did* serve out their contract', existing evidence on how well apprentices fulfilled their contracts is ambiguous.[9] On the most common measure, the proportion of apprentices becoming masters, apprentices' completion rates were often below 50 per cent.[10] This presents an empirical challenge to several hypotheses about apprenticeship: how can low completion rates be reconciled with successful guild contract enforcement? Alternatively, why not complete if the main reason for apprenticeship was the privileges derived from completion?[11] However, data on apprentices becoming masters provides only a limited guide to the completion of contracts. Former apprentices could have migrated, remained journeymen, or died. It is usually impossible to tell whether

[3] On apprenticeship for security, see Lane, *Apprenticeship*, p. 2. On socialization, see Brooks, 'Apprenticeship', pp. 73–83; Smith, 'Apprentices'. More generally, see Kaplan, 'L'apprentissage'; de Munck, *Technologies*, pp. 201–5; Farr, *Artisans*, pp. 20–1.

[4] Kaplan, 'Reconsidering', p. 212.

[5] Epstein, 'Craft guilds, apprenticeship, and technological change', pp. 688–92; idem, 'Discussion', pp. 160–2; Humphries, 'English apprenticeship', p. 74; van Zanden, 'Skill premium', pp. 139–40.

[6] Epstein, 'Craft guilds, apprenticeship, and technological change', p. 687. See also Humphries, 'English apprenticeship', pp. 84–5; van Zanden, 'Skill premium', pp. 139–40.

[7] Ogilvie, 'Guilds, efficiency, and social capital', pp. 302–14. See also eadem, 'Rehabilitating the guilds', pp. 177–8; and eadem, 'Can we rehabilitate the guilds: a sceptical reappraisal', Cambridge working papers in economics, 0745 (2007) (http://www.dspace.cam.ac.uk/handle/1810/194730), pp. 16–30. Similar implications can be drawn from de Munck's study of Antwerp apprenticeship: *Technologies*, pp. 118–19.

[8] Davids, 'Apprenticeship', pp. 66–70. See also Stabel, 'Social mobility', p. 175. Humphries, 'English apprenticeship', pp. 87–92, also draws attention to characteristics that could induce commitment to contracts in the absence of guilds.

[9] de Munck and Soly, 'Learning', p. 10.

[10] Completion rates are surveyed in Wallis, 'Apprenticeship', pp. 838–9, 855. See also Stabel, 'Social mobility', pp. 165, 168–9; and J. Humphries, 'Rent seeking or skill creating? Apprenticeship in early industrial Britain', paper presented at the XVth World Economic History Congress, Utrecht (7 Aug. 2009), pp. 3–4.

[11] Epstein, 'Craft guilds, apprenticeship, and technological change', p. 706, n. 82, noted completion rates but did not discuss their implications. Ogilvie, *State corporatism*, pp. 157–8, discussed completion rates of weavers in Wurttemberg, and completion rates more generally in eadem, 'Can we rehabilitate the guilds' (see above, n. 7), p. 25.

apprentices left early, or if their completion simply went unrecorded.[12] Non-completion was also only one way in which apprentices and masters could breach contracts, and qualitative studies of apprentices' experiences have shown how far some apprenticeships departed from the rules. Of necessity these analyses rely largely on fragmentary evidence, usually autobiographies and legal records, and cannot identify how frequently rules were ignored.[13]

In this article, we explore the enforcement of apprenticeship rules in early modern England through new evidence about the persistence of apprentices in their contracted masters' households at various stages of their term of service in London and Bristol in the late seventeenth century.[14] Our sources allow us to examine what proportion of apprentices left early, when they departed, and—through information on their origins and their masters—what differentiates those who left from those who remained. Additionally, citizenship records allow us to examine the relationship between persistence and later becoming a master. Given the range of issues in recent debates on apprenticeship and guilds, we should delineate what we do not examine. We do not consider guilds' regulation of the content of training. Indeed, we have no information on the training apprentices received. Finally, our evidence excludes apprenticeship outside the corporate system.

Our results indicate that the rules and reality of apprenticeship in early modern England diverged substantially.[15] Despite the law or guild and civic enforcement, the formal procedures of apprenticeship were frequently and consistently evaded. Many apprentices left their masters temporarily or permanently before their terms were completed. Distinctive patterns of absence occurred in particular trades and guilds. Apprentices' behaviour was broadly consistent with their resources and opportunities.[16] While a completed apprenticeship remained a route to guild privileges, many youths apparently entered service with little intention of remaining with their master for seven years. The superficially rigid rules of apprenticeship disguised a plural and flexible training institution that adapted to the needs and circumstances of individuals. Completion was only one of several possible outcomes of corporate apprenticeship in these English cities.

I

London and Bristol in the late seventeenth century offer useful starting points for examining apprenticeship. Apprentices in England were highly mobile, migrating long distances, serving masters with whom they had no kin or geographical connection, and usually training in occupations different from those of their

[12] A few sources record the termination of contracts, but do not state when termination occurred: Ben-Amos, 'Failure', pp. 166–7; Steidl, 'Silk weaver', pp. 145–50 (although see also p. 135, n. 12); de Munck, *Technologies*, pp. 190–1.

[13] For non-completion in England, see Griffiths, *Youth*, pp. 330–5; Ben-Amos, 'Failure'; Rappaport, *Worlds*, pp. 232–4; Davies, *Enforcement*. For continental Europe, see Steidl, 'Silk weaver', pp. 143–6; Sonenscher, *Work and wages*, pp. 108–11; Edgren, 'Crafts', pp. 368–71.

[14] The method was piloted for London in Wallis, 'Apprenticeship', pp. 839–41.

[15] On the separation of rule and reality in various aspects of guilds, see Sosson, 'Les métiers'; Stabel, 'Guilds', pp. 205–9; Rosser, 'Crafts', pp. 4–5; Ogilvie, 'Guilds, efficiency, and social capital', pp. 292–4; Steidl, 'Silk weaver', p. 151.

[16] de Munck, *Technologies*, p. 193, draws a similar conclusion.

fathers.[17] London was England's largest city, with around half a million inhabitants in 1700. Apprentices were a major category among London's immigrants. In 1700, around 3,800 youths entered an indenture in London, implying that over 9 per cent of English males became apprentices there.[18] Bristol was the third largest English city, with around 20,000 inhabitants in 1700.[19] Atlantic trade was central to the city, and port-related production made up a further large share of its economy. Bristol's field of apprentice recruitment was smaller than that of London. Between 1686 and 1696, annually around 250 youths became apprentices in Bristol, largely from the city and neighbouring counties. Beyond sheer numbers, there were other differences in apprenticeship between the cities. Masters operated on a smaller scale in Bristol, where an average master had 1.0 apprentices present in his household, against 1.6 in London. The contrast was greater among wealthy masters: rich London masters had on average 2.4 apprentices present, versus 1.2 for rich Bristol masters.[20]

For both cities we constructed samples of apprentices and their masters in the 1680s and 1690s that identify which apprentices remained with their masters. For London, the sample linked four sources: 48 livery companies' apprenticeship registers, containing 17,868 apprentices from 1685 to 1695;[21] the 1692 Poll Tax Database, listing *c.* 13,000 heads of households with their occupation;[22] the Index to the 1695 Marriage Duty Assessments, enumerating 110,000 London inhabitants;[23] and the Association Oath Rolls (1696) recording 21,970 London signatories to an Oath of Loyalty.[24] Each linkage used at least two distinct characteristics, while the Association Oath allowed us to exclude duplicates.[25] Finally, we compared our sample of apprentices and masters with the manuscript household listings for the Marriage Duty to see which apprentices indentured over the previous decade still lived with their masters in 1695.[26] For Bristol we linked the complete published Marriage Duty Assessment listing from 1696 to the population of apprentices indentured in the city from 1686 to 1696.[27] Matching was

[17] T. Leunig, C. Minns, and P. Wallis, 'Networks in the premodern economy: the market for London apprenticeships, 1600–1749', Center for Economic Performance, discussion paper 956 (2009).

[18] Total apprentices estimated from the Orphans' Duty, a tax on indentures, for 1699 and 1700: London Metropolitan Archive (hereafter LMA), COL/CHD/0A/12/1, 6th and 7th accounts. Population share is total apprentices divided by 42,519 male 17-year-olds, the average age apprenticeships began; P. Wallis, C. Webb, and C. Minns, 'Leaving home and entering service: the age of apprenticeship in early modern London', London School of Economics, working papers in economic history, no. 125/09 (2009), p. 27. The number of 17-year-olds is calculated from the share of the population aged 15 to 24 in 1701, assuming an equal sex ratio and that 17-year-olds were a tenth of the cohort; Wrigley, Davies, Oeppen, and Schofield, *Population history*, pp. 614–15.

[19] Sacks, *Widening gate*, p. 353; Corfield, *Impact*, p. 15; Yarbrough, 'Geographical and social origins'.

[20] Figures derived from the samples described below.

[21] Webb, *London livery*.

[22] J. Alexander, 'Poll Tax database', Centre for Metropolitan History, Univ. of London. See Arkell, 'Poll taxes'; Alexander, 'Economic and social structure'.

[23] 6 & 7 Wm. & M., c. 6. Glass, *London inhabitants*; LMA, COL/CHD/LA/04/02/003-004.

[24] Webb, *Association Oath Rolls*.

[25] For full details of the linkage, see C. Minns and P. Wallis, 'Rules and reality: quantifying the practice of apprenticeship in early modern Europe', London School of Economics Department of Economic History, working papers in economic history, 118/09 (2009). To overcome the problem of variant spellings we employed the double metaphone algorithm developed by Gill Newton (Cambridge Group for the History of Population and Social Structure, University of Cambridge), before manually sifting for good matches. We could not link merchants in London, as they were categorized differently in the 1692 Poll Tax. We have, however, included a sample drawn from the merchants identified by Gauci, *Politics of trade*, pp. 19–24.

[26] LMA, COL/CHD/LA/04/01/1-110.

[27] Ralph and Williams, eds., *Inhabitants of Bristol*; Bristol Record Office (hereafter BRO), 04353/2.

simplified because masters' wives' names appear in Bristol's apprenticeship register. We identified 1,091 apprentice and master pairs in London and 2,230 in Bristol, where linkage was easier. Roughly 60 per cent of the London sample lived within the city walls, broadly in line with the metropolitan population.

The samples include a range of apprentice and master characteristics. We know apprentices' places of origin, giving us the distance they migrated,[28] and their father's occupation.[29] We know the size of masters' households, whether another apprentice was present, and some indication of their wealth (whether or not they had over £600 in personal estate or an income of £50 per annum). For London, we also know whether the apprentice's father was deceased, if he was a citizen of the city and, if so, his livery company, and whether the master lived within the City walls or outside, where the city's companies were weaker.[30] Unfortunately, different information about the master's occupation survives. For London, we only know masters' companies. Although technically centred on particular crafts, London's companies included freemen practising a range of occupations. For Bristol, masters' actual occupations were recorded.[31]

The linking process means our samples do not represent the full variety of apprenticeship situations. In London, we capture only living masters who had been householders for at least three years, biasing our sample towards the more successful and prosperous.[32] Quakers are also excluded, as they generally refused to take the Association Oath. For Bristol, our sample is more comprehensive, but may miss masters who died before 1696. We also make one key assumption: that apprentices in service lived with their masters. This assumption appears to be generally correct for this period.[33] For example, in Bristol lodging elsewhere appears sufficiently unusual that it was recorded specifically for the three indentures where this occurred. Moreover, there is no evidence that lodging varied over apprentices' terms in a manner that could explain the patterns of absence we found. Absence probably indicates a temporary or permanent break in the direct training relationship between apprentice and master, although, as we will see, apprentices might be away acting as agents for their masters.

A final consideration is that our data are drawn primarily from the 1690s. Our sample of apprentices crosses the Glorious Revolution. Most were indentured in a period of political tension and economic difficulties. The Nine Years War (1688–97) depressed trade and shipping. By 1695 Bristol alone had lost 202 ships to the French. English exports to Spain and the Mediterranean were a quarter of

[28] Estimated distance between the county town and London or Bristol.

[29] We used E. A. Wrigley's 'Primary, Secondary, Tertiary (P.S.T.)' codes when grouping fathers' occupations; Wrigley, *Poverty, progress, and population*, chs. 5 and 11.

[30] Berlin, ' "Broken" ', pp. 77–8; cf. Ward, *Metropolitan communities*, pp. 26–39.

[31] The Bristol data also identify 60 pauper apprentices, although only 20 can be linked to an identified master. Because of the small numbers, these observations are excluded.

[32] This three-year survival bias is the result of linking 1692 and 1695 data to produce our sample. Our Bristol sample does include new masters. There, the time elapsed since a master became a burgess (citizen), a proxy for establishing oneself as a master and householder, did not affect the outcome of apprenticeships. We identified 492 masters in the burgess list, including 80 who became burgesses fewer than three years before taking an apprentice. Among 'new' masters, 55.0% of apprentices were present in 1696, compared to 54.4% for 'older' masters. Regression estimates of the determinants of retention for apprentices for new and established masters are similar to the results in tab. 5.

[33] Further discussion of this assumption is in Wallis, 'Apprenticeship', p. 842. For lodging in European apprenticeship more generally, see de Munck and Soly, 'Learning', p. 21; Steidl, 'Silk weaver', p. 147.

their mid-1680s level.[34] Wartime taxation further pressured manufacturing and trade.[35] Uncertainty around the specie led to a recoinage in 1696 and an economic crisis from shortage of coin.[36] Added to bad harvests, this produced high food prices, peaking in 1698, and lower real wages.[37] Plausibly these conditions influenced selection into apprenticeship. It is less obvious, however, that they would affect decisions to remain in apprenticeship once families had invested time and resources in securing training. We cannot say from our data whether apprenticeship in the 1690s reflects practices earlier or later. That said, rates of entry to mastership appear to be similar to earlier periods, while the institutional system of corporate apprenticeship appears to have functioned much as it had for a century: the strength of English guilds has been debated, but they continued to register apprentices, police the number recruited, and settle disputes between masters and apprentices.[38]

II

Legally, apprentices' service began when they signed their indenture and took their oath.[39] Once indentured, apprentices were legally tied to a master for the term specified in the contract. The reality of English apprenticeship appears less settled, however. Figure 1 gives rolling 10-month averages for the proportion of apprentices present in their masters' households in London and Bristol during their terms. Each observation month represents the behaviour of a different cohort of apprentices. For example, for London the first month of year five shows the proportion of apprentices bound in May 1690 who were still present in May 1695. Two caveats need to be emphasized. First, as snapshots, they say nothing about changes in the composition of the stock of apprentices over time. Second, three types of absence may underlie our calculations: some apprentices were away temporarily, others had left permanently, and some might never have actually resided with their master, despite their indentures. The rolling averages will be lower than the actual proportion of apprentices present at some stage in their terms, as a single cross-section cannot distinguish between different types of absence.

In both London and Bristol we find clear patterns of staged decline over apprentices' terms. Many apprentices left their original masters' households before their contract was completed. Most departed in the first half of their term. In London, the proportion of apprentices present peaked between the sixth and twenty-fourth month of service. It then declined sharply to a trough in year four. After small fluctuations, the final decline comes at the end of the sixth year. The

[34] Jones, *War and economy*, pp. 130–1, 159; Rose, *England*, pp. 126–8.

[35] Brewer, *Sinews*, pp. 89, 95–100, 114.

[36] Rose, *England*, pp. 137–40; Horsefield, *British monetary experiments*, pp. 14–17; Jones, *War and economy*, pp. 20–1.

[37] Clark, 'Price history'; Clay, *Economic expansion*, vol. I, p. 52.

[38] On guilds' powers, see Walker, 'Guild control'; Schwarz, *London*, pp. 210–11; Berlin, 'Guilds in decline?'; Kellett, 'Breakdown'.

[39] In London, company registration usually occurred the same day as binding. Of 72 surviving indentures, 67 bear the same date as their registration, three differed by one day, one by four days, and one by three months; LMA, COL/CHD/FR/02. In Bristol, indentures were sealed at the city's Tolzey Court.

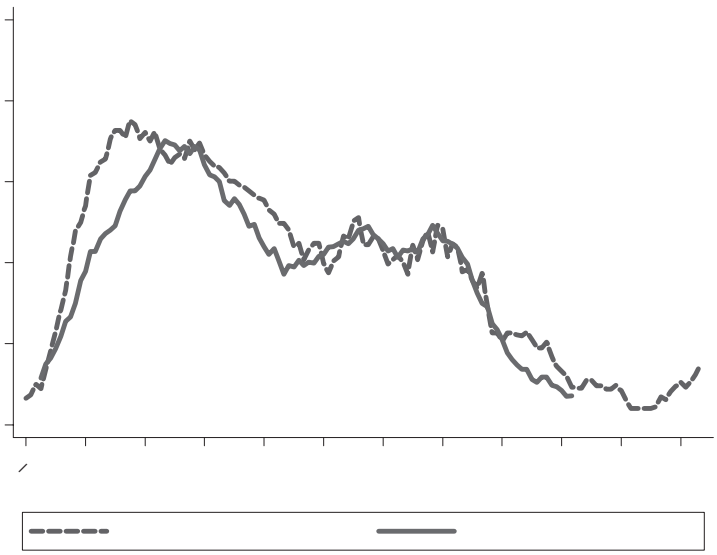


Figure 1. *Proportion of London and Bristol apprentices resident with their master*
Sources: See text for details of sample construction.

Table 1. *Apprentices present with masters, before and after indenturing, London and Bristol*

	No. of apprentices		*% present with master*	
Period of service (years)	*London*	*Bristol*	*London*	*Bristol*
–1 to –0.51	38	0	0	0
–0.50 to 0.01	33	47	42	6
0 to 0.49	31	70	61	24
0.5 to 0.99	46	91	70	41
1 to 6	453	885	50	58

Note: Children of masters excluded.
Source: As for fig. 1.

two falls at the end of years seven and eight reflect the mix of terms in our sample. Bristol's patterns are broadly similar, although slightly more compressed than London's.[40]

While the dominant impression of figure 1 is the decline in presence over time, it is also clear that the start of apprenticeship was not clear-cut. Some apprentices prefaced service with a trial period.[41] As table 1 shows, trials were common in London, where 42 per cent of apprentices were present in the six months before they were bound; less so in Bristol, where 6 per cent of apprentices were present early. The smaller size of the city and its recruitment market may help explain this. No trials exceeded six months.

[40] Bristol apprenticeships were for seven years, with three exceptions in this period bound for eight years.
[41] Dunlop and Denman, *English apprenticeship*, p. 162.

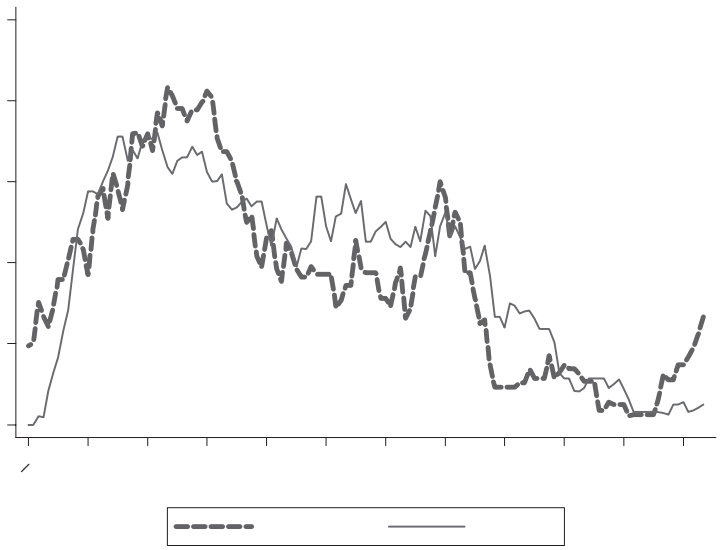


Figure 2. *London apprentice persistence, migrants and locals*
Sources: See text for details of sample construction.

The slow arrival of many other apprentices is also striking. Apprentices' training apparently often began much later than the start of their indentures. In London, only around two-thirds of apprentices were present in their first year, with the proportion rising from 61 per cent in the first six months to 70 per cent in the second (table 1). In Bristol the lag was even more pronounced: the proportion of apprentices present exceeded 50 per cent only a year after service technically began. This was not because young apprentices remained at home while working.[42] A few may have been away at school.[43] For many, the legal and effective dates of contracts apparently differed: these apprentices took their oaths and then left again, joining their masters months or years later. Consequently, if they completed, most apprentices' actual period of service was substantially shorter than the statutory minimum.

Behind these aggregate patterns of apprenticeship lies considerable variation among different groups and trades that is not captured in formal rules or standard accounts of service. One aspect is a subtle difference between local and migrant apprentices. In London, migrants' earlier arrival often translated into slightly longer effective terms, as they left around the same time as London-born apprentices (figure 2). In Bristol (figure 3) locals' effective terms were longer than migrants, who were absent particularly toward the end of their terms.[44] This probably reflects differences between apprentices in the two cities, particularly the

[42] If this occurred, we would expect more migrants to be present in year one. This was not the case.
[43] Ben-Amos, *Adolescence*, pp. 112, 173; Guildhall Library, London (hereafter GL), MS 5257/5, fo. 131.
[44] For both London and Bristol, we estimated regressions of apprentice presence against dummy variables for year of binding, and interaction terms between year of binding and migrant status. For Bristol, four of the eight interaction terms are statistically significant at the 5% level, with migrants less likely to be present at both the beginning and end of the specified term. No interaction terms are significant in London's smaller sample, though several indicate large marginal effects in the order of 7 to 11 percentage points.

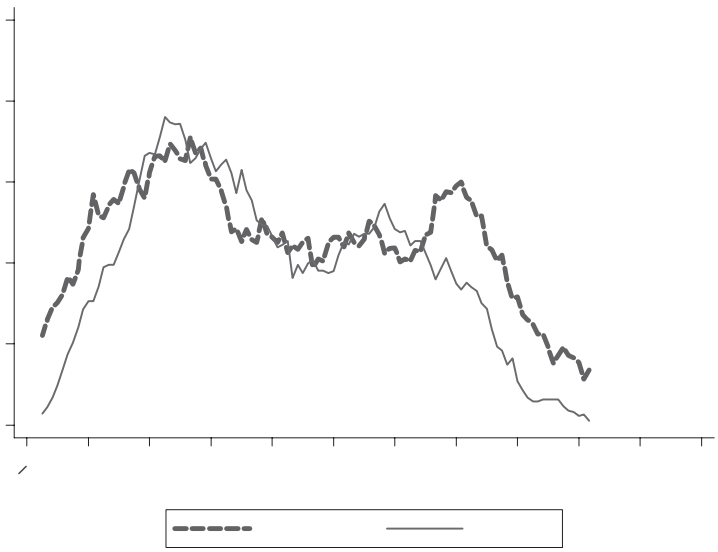


Figure 3. *Bristol apprentice persistence, migrants and locals*
Sources: See text for details of sample construction.

higher bar to departure created by the longer distances migrant apprentices travelled to London, and the relative appeal of opportunities elsewhere compared to those in expanding London or provincial Bristol.[45]

The most striking differences in apprenticeship were between occupations. This is most visible for Bristol, where we know the master's occupation (figure 4). The most dramatic divergence from the city average, presented in figure 1, was among merchant and seafaring apprentices (figure 4a) who might travel on behalf of their master. Merchants' apprentices' work as an overseas factor was often the foundation of their later independent trading. Service abroad could be determined formally. For example, the indenture for seafarer apprentice Thomas Garrard specified that 'at the end of three years [he was] to go to sea'.[46] Nevertheless, that these apprentices were absent for much of their service period was unexpected.

Service in other trades more closely resembled the city average, but the occupational breakdown does usefully highlight two characteristics of apprenticeship. Firstly, most trades showed a distinctive decline in the second half of apprentices' terms, followed by a resurgence in the year or so before completion that may be due to apprentices returning to regularize their service and allow their masters convincingly to present them as having completed their terms (figure 4b–e).[47] Secondly, the differences between local and migrant apprentices varied between trades, a pattern clearest in general manufacturing trades which were practised

[45] The average apprentice migration to London was 134 miles, compared to 44 miles to Bristol.
[46] Grassby, *Business community*, pp. 195–6; Gauci, *Politics of trade*, pp. 71–3; BRO, 04353/2, fo. 243.
[47] The resurgence does not appear to be a cohort effect, due to demographic or economic factors. The timing of the bump is similar in London and Bristol though the observation points differ by a year. Secondly, the difference between local and migrant resurgence suggests that endogenous rather than exogenous factors drive that pattern.

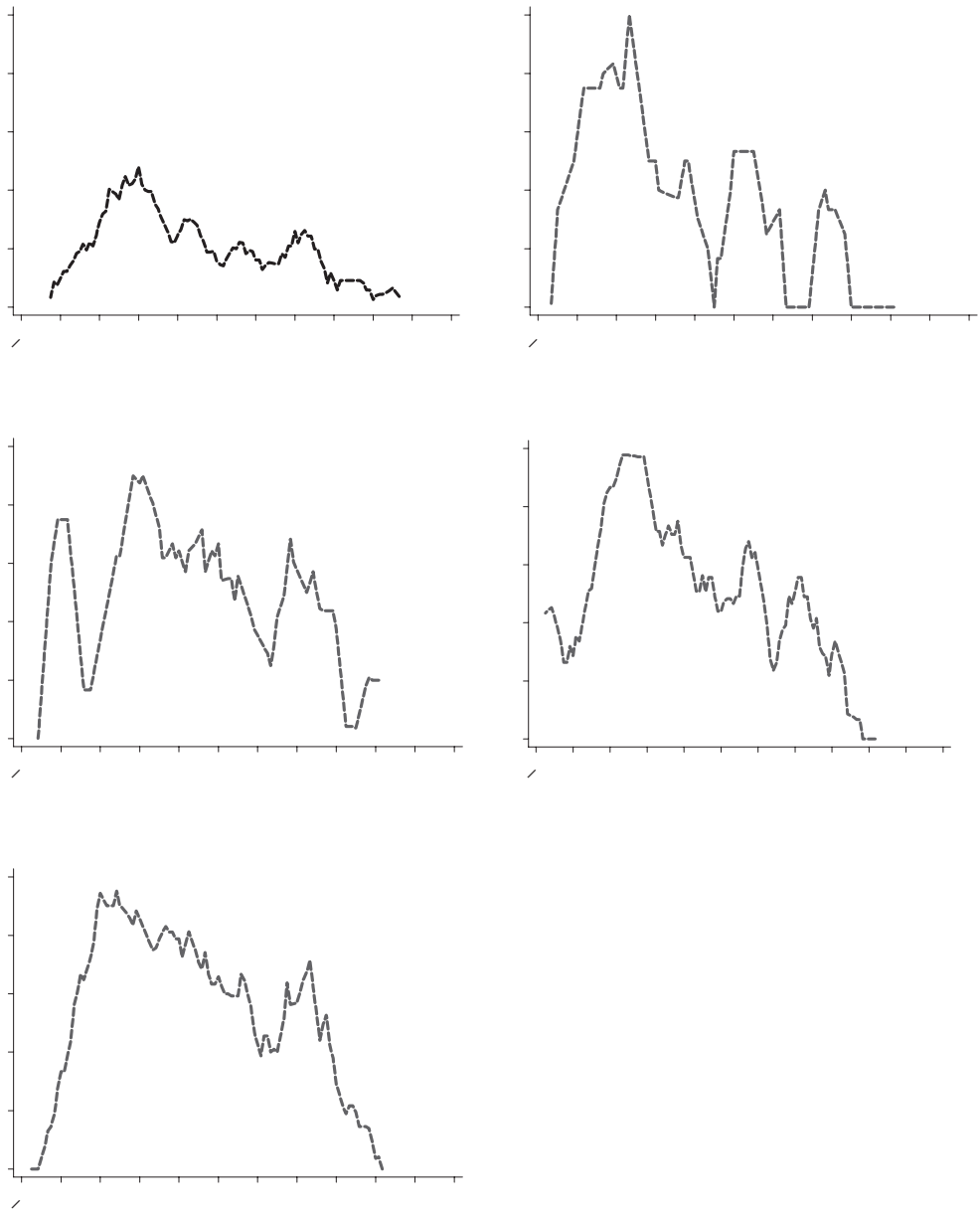
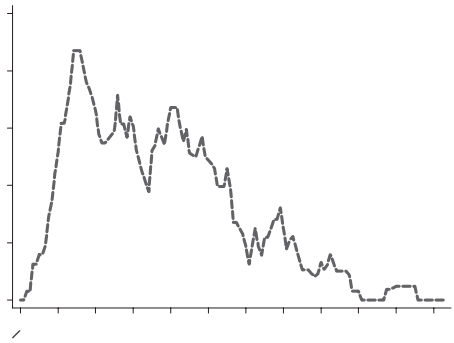


Figure 4. *Bristol apprenticeship persistence, selected trades*
Sources: See text for details of sample construction.



widely beyond the city.[48] Local-born apprentices in these trades usually returned and completed: 63 per cent were present in years six and seven, versus 50 per cent in years four and five. Among migrants, presence declined in their last two years: only 54 per cent were present in years six and seven, against 77 per cent in years four and five.[49]

For London, we can subdivide apprentices only by company. Even this reveals striking differences that echo Bristol. As figures 5a and b show, the proportion of apprentices present with their masters in the larger, less cohesive, and more mercantile companies of the Great Twelve falls more dramatically over their terms than in the smaller, more homogenous lesser companies. The rise in presence at the end of the term is also more marked outside the Great Twelve, suggesting greater concern with regulations. Although the Great Twelve were relatively rich and powerful, their size and occupationally varied membership made monitoring

[48] This group consists of apprentices in the following trades: cordwainer, weaver, blacksmith, pewterer, currier, serge-weaver, clothworker, pinmaker, silkweaver, brazier, serge-maker, carpenter, glover, turner, smith, culter, dyer, and basketmaker.

[49] We do not illustrate the migrant/local split in fig. 4; the number of observations in each rolling interval are small.

apprenticeship and employment difficult. Our data are most abundant for two London companies: the Vintners (figure 5c), which was one of the Great Twelve, and the Apothecaries (figure 5d), which was not. They show divergent patterns, probably reflecting institutional abilities and the characteristics of each occupation. Apothecaries showed high return rates at the end of their terms; it was a relatively well-regulated, highly skilled, and homogenous company, whose members tended to run small shops. Vintners' apprentices, by contrast, present a strong downward trend in the proportion present; their masters typically recruited many apprentices, presumably anticipating high dropout rates, and employment in taverns and the wine trade demanded less skill and more staff.[50]

One point where the rules of apprenticeship did work as specified was at the end of the term. For those who got there, completion precipitated a firm break. Few apprentices remained in residence with their masters after their seventh year. Migrant apprentices in London left a little more slowly: a quarter remained with their masters in their ninth year. However, their departure was deferred only temporarily. Compared to better connected locals, migrants may have relied more on their masters for an initial opportunity as a journeyman. They may also have been making up time lost through earlier absences: travel time would have multiplied the impact of temporary departures for sickness, family, or holiday. In general, apprenticeship did not lead into an ongoing employment relationship.[51] Consequently, few of the reasons that are sometimes proposed to explain why modern companies take apprentices, such as information about employees' skills, or why apprentices remain in service, such as higher earnings after completion, could apply in this context.[52]

On the whole, apprentices more often trimmed months off their contracts than extended them. Laggards at the start of service, they departed precipitously at the end; the proportion present fell from the beginning of their seventh year, if not earlier. Guild records occasionally contain agreements for early completion, sometimes in exchange for a gift or fee.[53] However, a larger proportion of apprentices were absent during their final months of service than official records would indicate. This suggests contemporaries considered a satisfactory level of training was often achievable in fewer than seven years. Youths' time could be better spent elsewhere, perhaps at school, while they were technically fulfilling their term requirements, much as midshipmen in the English navy were entered on to ships' books to acquire notional sea time in the eighteenth century.[54] Shortened terms do not imply that apprenticeship was not training, however. Most continental European apprenticeships lasted under seven years. By trimming their terms, English youths brought their experiences closer to those of their continental peers.[55]

[50] Wallis, 'Medicines', p. 146. Between 1600 and 1750, London vintners who took any apprentices trained an average of 4.7 over their career.

[51] Cf. Levene, ' "Honesty" ', p. 192.

[52] Acemoglu and Pischke, 'Beyond Becker'; Smits and Stromback, *Economics*.

[53] LMA, COL/CA/05/02, s.v. Baron (1690); Batty (n.d.); Chase (*c.* 1688); Corbett (*c.* 1670).

[54] We owe this comparison to one of the referees.

[55] Evidence from Vienna suggests that effective terms in that city were also shorter than prescribed by law; Steidl, 'Silk weaver', pp. 143–5.

III

What had happened to the one in two apprentices who were missing from their masters? There are several possible explanations for apprentices' absences. Perhaps 10 per cent of apprentices died during their term: migration into cities carried health risks.[56] Some apprentices left their trade, were ejected for disorder, crime, marrying, or some other breach of their indentures, or were abandoned by their masters.[57] A few apprentices even conspired with their masters to evade the rules. For example, in 1711 Thomas Blee was accused of being 'turned over to . . . a Carrman under colour of Service but never actually served him as an apprentice but hath ever since acted as a Porter'.[58] The remainder continued to train or work in the same trade. Among these apprentices were some who had permanently left their master, either legally or illicitly, while others worked elsewhere on his behalf.[59] Runaways tend to dominate the surviving sources—which are largely from legal disputes—but departures could benefit both apprentices and masters. If mutually agreed, departure normally occurred without any external record.[60]

Legitimately mobile apprentices do appear occasionally 59-1pearnal record.t909TD3(

complicating the picture. For example, Thomas Gibbs, a London baker's apprentice, served a different master for the first six years of his term 'but was not turn'd over to him according to the Custome'. However, he was then 'turn'd over before the Chamberlain to Joseph Golding of the same Company & Trade with whom he completed the terme'.[66] Among our London sample, 27 (2.5 per cent) were officially turned over; in Bristol the total was 54 (2.5 per cent). These are implausibly low rates, probably due to the limits of the records; although our samples do necessarily exclude most cases where a move would have been forced by death or disruption of business.[67]

To what extent were apprentices turned over to masters in the same city? In an attempt to achieve a better estimate of the importance of this reason for absence in London, we identified which servants or lodgers living with masters in our sample had been indentured to another master in the same company during the previous seven years. We identified 65 probable apprentices, some of whom might have been only temporarily absent from their original masters.[68] Our sample of masters took 916 apprentices in the seven years before the tax listing was made (of whom 455 were present in 1695). This suggests that a minimum of 7 per cent of apprentices moved to other local, and legitimate, masters. In Bristol, we searched for the 619 apprentices indentured in the seven years to 1696 who were not with their original master. We found 28 living with householders who shared their original masters' occupations. This gives a lower rate of internal mobility than London (2 per cent), but the tighter constraints in linkage mean this is probably an underestimate.[69] For Bristol, where the smaller population renders nominal linkage feasible, we also looked for absent apprentices in other city households.[70] To reduce the effect of bad matches, we searched for two groups: coopers' and soapmakers' apprentices—both likely to return to their master—and a general group of unusually named apprentices.[71] Of 33 absent coopers' and soapmakers' apprentices, two were with their parents and nine may have been servants in other households, although several of these had common names.[72] Of the 24 absent apprentices with unusual names, two were 'servants' in other households, two were with their parents, and one had married and established an independent household. It is unclear if we can generalize from this. Nonetheless, these rough figures suggest that movement to another master in the same trade and city might account for around 10 per cent of apprentices absent in 1695. Such local legitimate circulation is unlikely to explain most absences. It seems that many absent apprentices were either away from the city, or now worked outside the corporate system.

[66] LMA, COL/CA/05/02, D-K, s.v. Gibbs (*c.* 1718).

[67] In Bristol 53 apprentices (22 of whom were present) were bound to masters who died before 1696 and whose widows maintained their household.

[68] The linkage was restricted to apprentices bound from 1688 to 1695, who were not found with their own master, and who did not possess a common name (for example, John Smith, Thomas Powell). The 65 people matched to apprentices were with 46 different masters. Our initial linkage was on forename and surname using double metaphone, followed by manual checking.

[69] Occupational information in Bristol is relatively precise compared to company-level information for London. This leads to the exclusion of links where apprentices may have worked in cognate trades (such as blockmaker and shipwright) or masters pursued multiple occupations.

[70] This is also a further argument against explaining persistence rates by lodging out.

[71] Unusual names were those occurring fewer than six times among the 356,000 people named in marriage licenses from the Vicar-General of the Archbishopric of Canterbury between 1694 and 1800; Society of Genealogists, 'Vicar Generals' marriage licence index'.

[72] For three apprentices, there was more than one possible nominal linkage.

IV

The implications of apprentices' high rates of absence can also be examined through the effects of departure on their subsequent corporate careers. Apprenticeship was the major basis on which young men became freemen and burgesses, as citizens were termed in London and Bristol, respectively. Citizens' privileges—particularly the right to trade independently and the right to vote—were the key benefit from completion. Data are patchy for London and better for Bristol.[73] In both cities, masters had to swear that their apprentice had served his full indenture 'after the manner of an Apprentice' before he could be freed; the penalty for dishonesty was disenfranchisement for both.[74] Freedom rates thus offer an indication of the extent to which absence indicated a breakdown of service and training.

In both London and Bristol, about 40 per cent of apprentices later became citizens.[75] Local apprentices were somewhat more likely to become citizens than migrants, reflecting the cities' roles as training centres and the advantages of local resources in establishing a business.[76] Most apprentices who later became citizens remained with their masters.[77] However, a substantial minority of future citizens—33 per cent in London and 28 per cent in Bristol—were absent. The proportion of future citizens present declined over their term of service in London, falling from an average of 74 per cent present between six months and three years to an average of 63 per cent present in years four to six, although not in Bristol. Indeed, more than a quarter of absent apprentices would later become citizens.[78] For both cities, these rates of absence among apprentices who later became citizens substantially exceed our admittedly rough estimates for movement within a trade and city. Together with the evidence discussed earlier of apprentices returning to their masters towards the end of their terms, this underlines the importance of temporary departures from their masters and probably their cities in the experiences of apprentices.

Even among those apprentices who remained with their masters, service was not a direct route into the citizenry, particularly in London.[79] A substantial minority of apprentices who were present with their masters in the final year of their contracts

[73] For London, we use freedom records for 18 companies with 674 apprentices in our sample: the Masons, Clockmakers, Curriers, Tylers, Carmans, Ironmongers, Blacksmiths, Painters, Fishmongers, Distillers, Stationers, Apothecaries, Butchers, Turners, Vintners, Innholders, Cooks, and Grocers. For Bristol, see Bristol & Avon Family History Society, *Bristol burgess books*.

[74] For certification, see LMA, COL/CHD/FR/12/048, s.v. Cheale (1766). Disenfranchisement was enforced; see, for example, LMA, Repertories, vs. 70, fo. 19b; vs. 87, fos. 199b, 206b, 210; vs. 91, fo. 98; vs. 92, fos. 103, 215; LMA, COL CHD/FR/12/048, s.v. Ansley (1720). Some disenfranchisement cases, including untrue declarations by masters, are indexed at LMA, COL/CHD/FR/12/005.

[75] London, 40%; Bristol, 46%. To reduce the impact of late arrivals on the figures, we refer here to the proportion of apprentices present from six months after indenturing to seven years. A test of means comparing the differences between London and Bristol yields a t-statistic of –1.1, well short of conventional levels of statistical significance. Detailed statistics on freedom rates by year of service can be found in Minns and Wallis, 'Rules and reality' (see above, n. 25), tabs. 2 and 3, pp. 44–5.

[76] Local versus migrant rates are 43% to 38% in London and 45% to 41% in Bristol. The t-statistic on a test of means for differences between migrants and locals is 1.0 for London, and 1.6 for Bristol. The second suggests a difference close to statistical significance at the 5% level.

[77] The proportion of apprentices later freed who were present in 1695 was 67% in London and 72% in Bristol. Both city differences have high levels of statistical significance, with t-statistics above 7.

[78] The proportions of absent apprentices later freed are London, 25%; Bristol, 31%.

[79] Cf. Farr, *Artisans*, p. 34.

Table 2. *Explaining apprentice retention, London sample, 1687–95*

	Probit—marginal effects		
	(1)	*(3)*	*(4)*
	All	*London or Middlesex origin*	*Migrant origin*
Migrant	0.11 (2.05)**	—	—
Parent deceased	0.02 (0.50)	–0.01 (–0.08)	0.05 (0.87)
Parent citizen of London	0.16 (2.37)**	0.16 (2.21)**	—
Parent gentleman	–0.04 (–0.50)	0.25 (1.46)	–0.11 (–1.26)
Parent yeoman	–0.03 (–0.41)	0.19 (1.08)	–0.07 (–0.98)
Parent other agriculture	–0.001 (–0.00)	—	0.17 (0.57)
Parent distribution and sales	0.03 (0.45)	0.17 (1.96)*	–0.21 (–1.86)*
Parent service	–0.10 (–1.17)	–0.26 (–2.08)**	0.10 (0.73)
Parent other professional	–0.05 (–0.55)	–0.18 (–1.00)	–0.06 (–0.57)
Parent labourer	0.07 (0.44)	–0.34 (–1.43)	0.36 (1.58)
Master household of seven or more	–0.07 (–1.57)	–0.02 (–0.27)	–0.16 (2.53)**
Master rich	0.07 (1.57)	–0.08 (–1.08)	0.19 (3.05)***
Master inside city walls	0.09 (2.17)**	0.04 (0.59)	0.14 (2.64)***
Master Great Twelve company	–0.13 (2.57)***	–0.12 (–1.42)	–0.14 (–2.10)**
Pseudo R^2	0.10	0.18	0.12
N	685	272	413

Notes: The sample consists of apprentices bound in London between May 1687 and April 1695. Coefficients are marginal effects, and z-scores are in parentheses. Year dummies are included in all specifications. Craft worker is the excluded parent occupation group. Coefficients marked *, **, and *** are significant at the 10%, 5%, and 1% level.
Source: As for fig. 1.

did not become citizens. In London, 26 per cent of apprentices present in year seven of their term never became citizens. In Bristol, the figure was 36 per cent. Although the exigencies of life could intervene in the plans of the most ambitious apprentice, it is hard to know if those who completed but never became citizens should be seen as failures, given that migration was an option and journeymen prospered in some trades.

V

As we have seen, apprenticeship varied between cities, between trades, and between locals and migrants. Evidence of turning over and citizenship rates reveal the importance of temporary movements within and beyond the city. But many departures appear to have been permanent. To explore why some apprentices remained with their masters while others did not, we have estimated probit regression models of apprentice persistence (tables 2 and 3). Our sources include information on the wealth, personal connections, and household characteristics of masters and apprentices, all of which may have affected completion.

Our data indicate whether apprentices were resident with their master on one particular day; this provides the dependent variable. The regression is estimated for those observations where we have information about the full set of apprentice and master characteristics: almost 700 observations for London and over 1,300 for Bristol. Summary statistics for the characteristics underlying the regression analysis are provided in appendix tables A1 and A2. It is important to emphasize that absence may indicate either permanent or temporary departure,

Table 3. *Explaining apprentice retention, Bristol apprentices*

	Probit—marginal effects		
	(1) All	*(2) Bristol origin*	*(3) Migrant origin*
Migrant	−0.10 (−20.87)***	—	—
Parent gentleman	−0.02 (−0.25)	0.20 (0.64)	−0.04 (−0.44)
Parent husbandman	0.22 (0.82)	—	0.18 (0.62)
Parent yeoman	0.05 (0.78)	0.09 (0.43)	0.04 (0.53)
Parent other agriculture	0.02 (0.48)	0.07 (0.32)	0.01 (0.12)
Parent distribution and sales	0.09 (10.81)*	0.12 (20.02)**	−0.01 (−0.05)
Parent service	−0.06 (−10.20)	−0.08 (−10.35)	−0.01 (−0.10)
Parent other professional	0.05 (0.83)	0.03 (0.25)	0.06 (0.75)
Parent labourer	0.11 (10.08)	0.16 (10.47)	−0.13 (−0.61)
Master barber	0.18 (20.08)**	0.12 (10.07)	0.27 (20.04)**
Master joiner	−0.01 (−0.13)	0.13 (00.84)	−0.12 (−10.03)
Master carpenter	0.18 (10.86)*	0.18 (10.60)	0.17 (10.02)
Master merchant tailor	−0.01 (−0.10)	0.03 (0.22)	−0.003 (−0.02)
Master baker	−0.02 (−0.22)	0.16 (10.09)	−0.13 (−10.03)
Master cooper	0.11 (20.13)**	0.16 (20.05)**	0.09 (10.15)
Master grocer	0.13 (10.37)	0.28 (10.84)*	0.05 (0.44)
Master merchant	−0.28 (−40.53)***	−0.12 (−10.36)	−0.41 (−50.02)***
Master soapmaker	0.14 (10.88)*	0.18 (10.61)	0.09 (0.87)
Master weaver	0.05 (0.52)	0.05 (00.47)	0.06 (0.35)
Master seafaring trade	−0.31 (−70.36)***	−0.25 (−40.08)***	−0.34 (−50.93)***
Master household of seven or more	−0.07 (−10.84)*	−0.08 (−10.56)	−0.07 (−10.26)
Master rich	0.01 (0.32)	−0.06 (−0.87)	0.10 (10.63)
Master same occupation as parent	0.14 (20.50)**	0.14 (20.47)**	−0.14 (−0.73)
Pseudo R^2	0.13	0.12	0.17
N	1341	646	695

Notes: The sample consists of apprentices bound in Bristol between Sept. 1688 and Aug. 1696. Coefficients are marginal effects, and standard errors are in parentheses. Craft worker is the excluded parent occupation group. All other master occupations are the excluded group for master categories. Coefficients marked *, **, and *** are significant at the 10%, 5%, and 1% level.
Source: As for fig. 1.

which our sources do not distinguish. We can partially address this shortcoming by including year dummies to control for changes in presence rates due to unmeasured factors causing temporary absences, and by controlling for the occupational and institutional differences that are likely to have determined patterns of temporary absence. In tables 2 and 3, we present estimates for three groups: all (column 1), local (column 2), and migrant (column 3) apprentices. Regression coefficients have been transformed into marginal effects. Some care should be exercised when comparing the two tables. In particular, the Bristol sample contains greater occupational detail than London, and some of the most interesting variables are recorded only for one city. We do not present estimates of pooled regressions due to the small number of common variables for the two cities. However, in a pooled sample, coefficients on common variables are broadly similar in the two cities; a statistically significant difference was found only for distance.[80]

The results confirm our earlier observations about occupational variation and differences according to apprentices' origins. Divergence between occupations is

[80] Results available on request.

clearest in Bristol, where the evidence is better. There, apprentices in manufacturing occupations, particularly coopering and carpentry, were most likely to be present. For London our data are weaker, but we do find a general difference between apprentices in London's Great Twelve companies and the rest. Apprenticeship also clearly varied in duration for locals and migrants. Migrant apprentices in London were 11 percentage points more likely to be present. In Bristol, by contrast, the pattern is reversed. These findings reinforce the patterns observed in figures 2 and 3; as noted earlier, we suspect the cities' variance reflects different migration pools, the scale of opportunities, and how apprentices were selected to the metropolis.

The real value of the regressions is in revealing additional reasons for absence among apprentices. They suggest that many absent apprentices had left because their prospects were better elsewhere, while those who remained often possessed local connections that improved their prospects in the city. The most compelling indication of this comes from data on whether Bristol masters and their apprentices' parents shared an occupation (table 3). The coefficient on this variable is positive and statistically significant in the full sample and among local apprentices (columns 1 and 2), but negative and insignificant among migrants (column 3). It seems plausible that a completed term was more valuable for those with local connections, while migrants were pulled away by external familial networks to which the benefits of Bristol training and connections were complementary.

In London, the size, quality, and location of apprentices' networks and family resources also affected completion. Citizens' sons were significantly more likely to be present. Migrant apprentices with fathers in distribution and sales occupations, where familial wealth and commercial connections were localized, were significantly more likely to be absent, while the opposite was true for locals.[81] We can also see the effect of institutional factors at work here: those with connections inside guilds, such as citizens' sons, had greater incentives to achieve membership; persistence was significantly lower among those entering a Great Twelve company than one of the smaller, more homogenous companies (column 1 and 3), while those whose masters lived within the City walls where corporate controls were stronger were more persistent (column 1 and 3).

The results also suggest that masters' volume of work, indicated by household size, and their levels of success, indicated by wealth, also shaped apprentice outcomes.[82] In London, migrant apprentices in large households (with seven or more non-apprentices in residence) were less likely to be present. Conversely, migrants matched to wealthy masters were more likely to persist, perhaps indicating the increased value of commercial connections obtained from those successful masters. These differences suggest that the quality of connections and

[81] Although the coefficient is not statistically significant, the behaviour of sons of gentlemen points to similar conclusions. Bristol shows a similar pattern for distribution and sales.

[82] In supplementary regressions (not included here), we decomposed household size into kin and non-kin components. It is impossible to do this perfectly for every household—there are unidentified kin apprentices in some (especially in Bristol) who are outside our sample. In these regressions the presence of non-kin household members is negatively related to apprentice persistence. This may suggest that apprentices were less attached in households with more workers, perhaps because masters with more employees could offer less time to each apprentice. Alternatively, non-kin household members may have replaced departed apprentices, which would also generate a negative coefficient.

opportunities a master could provide was more important for migrants; London-born apprentices relied less on their masters for networks.

VI

Our findings suggest that the institution of apprenticeship was much more fluid than is traditionally understood. English apprenticeship was not 'inflexible'.[83] As we have seen, in London and Bristol apprentices frequently started late, often left temporarily or permanently after serving only part of their term, and generally finished early. Many apprentices' terms consisted of a few years in residence followed by a period elsewhere, akin to work as a journeyman. While apprenticed, they experienced significant mobility and were probably exposed to different workshops. In this, English apprenticeship resembled training in some other parts of Europe which normally involved shorter terms followed by several years as a journeyman.[84]

Despite the generic norms of the Statute of Artificers, English apprenticeship was also shaped by occupational and individual circumstances. The likelihood that apprentices remained with their masters differed substantially between trades and companies. The behaviour of locals and migrants, and those with and without local connections, varied in ways that suggest that apprenticeship was adapted to the individual and their resources. We do not know whether early departures represented opportunistic behaviour, or if they were negotiated. Given the ubiquity of absences, however, most presumably were consensual. Whether a common apprentice culture could bridge such different experiences remains an open question, but such a range of forms of service surely confirms Griffiths's account of a 'multitude of particular worlds' among apprentices.[85]

Apprentices' high rates of departure suggest many saw completion and mastership as only one possible outcome of apprenticeship. The behaviour of migrant apprentices, in particular, shows how some youths circulated through cities to obtain skills and connections. Apprenticeship was an integral part of a wider, national training market. That youths started and left service in large numbers—often leaving after a period that equated in some continental settings to a full term—suggests apprenticeship was understood as an effective way to acquire skills and training, while the appeal of the institutional, social, and cultural privileges derived from completion varied.

Given these findings, formal institutions appear to have contributed little to regulating apprenticeship and creating human capital. In London and Bristol, the terms of service specified in indentures and statute law were breached despite guild supervision; these contracts were not self-enforcing as written.[86] Apprenticeship thrived, however, when measured by the numbers of entrants. Flexible apprenticeship might come at a cost, however. As Wallis suggests, masters could

[83] Cf. Lane, *Apprenticeship*, p. 2.

[84] Studies of contracts show much variation within trades and shorter terms: de Munck, *Technologies*, pp. 43–9, 63; Kaplan, 'L'apprentissage', pp. 450–1. On journeywork, see Reith, 'Circulation'; Ehmer, 'Worlds'.

[85] Griffiths, *Youth*, p. 165.

[86] Cf. Epstein, 'Craft guilds, apprenticeship, and technological change', pp. 690–2; de Munck and Soly, 'Learning', p. 10.

not assume they would recover any training costs in the latter part of an apprentice's term, as standard models of the economics of apprenticeship anticipate, leading to a different, and perhaps less efficient, training structure.[87] Apprentices might still suffer reputational damage if departure were ill managed.[88] Against this, we must set the potentially high costs of strictly enforced contracts that cannot be adapted to circumstances.

While the rules of apprenticeship were not observed exactly, they still mattered. The formal completion of indentures remained a concern for a substantial proportion of apprentices, including a number who would not become citizens, alongside those with strong local ties. For those who reached the close of their term, apprenticeships generally ended when they should; others tailored their movements to return to their master for their final years. The persistence of advanced apprentices, whose masters had presumably recovered their training expenses, suggests that the reputational and legal benefits of completion remained valuable: these apprentices supplied their masters with rents as trainees in anticipation of the rents they would receive from citizenship in the future. This may explain why the formal terms of apprenticeship survived despite the divergences we observe. Apprenticeship was more fluid than is usually thought, but England's urban economy continued to be shaped by the corporate structures of guilds and the requirements of the Statute of Artificers.

Apprenticeship in England was not the uniform and rigid institution sometimes imagined, vigorously policed by society and guilds. Rather it was an amalgam of informal norms developed around inflexible formal benchmarks. The evidence of internal and external mobility within apprenticeship suggests the existence of a market for training and apprentice-level labour in which apprentices and masters engaged in numerous ways. It remains to be seen whether apprenticeship elsewhere in Europe, or in smaller communities in England, operated similarly. English apprenticeship required an unusually long term, but counterbalanced this with significant legal privileges.[89] Elsewhere in Europe, prescribed periods of service varied more between individuals, trades, and cities.[90] Yet completion rates in some regions were as low as those we observe, and several recent studies have emphasized the 'flexibility' of training and the 'limited hold' of the guilds on apprenticeship.[91] Indeed, to the extent that western Europe's relatively low skill premium after the Black Death was the result of its apprenticeship system, it seems plausible that it was the weakness and lassitude, not the strength, of the institutions supervising training that mattered.[92]

[87] Wallis, 'Apprenticeship', pp. 845–91.

[88] Subsequent earnings may have reflected this; Humphries, 'Rent seeking' (see above, n. 10), pp. 7–8.

[89] For English rules, see n. 2 above. On terms elsewhere, see Reith, 'Apprentices', pp. 182–3; Steidl, 'Silk weaver', p. 142; de Munck, *Technologies*, pp. 59–68; Stabel, 'Social mobility', pp. 161–2.

[90] For apprenticeship rules and norms in continental Europe, see Kaplan, 'L'apprentissage', pp. 436–57; Epstein, *Wage labor*, pp. 80–91; Farr, *Artisans*, pp. 33–7; de Munck and Soly, 'Learning', pp. 10–13; Reith, 'Apprentices', pp. 182–4; de Munck, *Technologies*, pp. 59–68. On wages for apprentices, see Reith, 'Apprentices'.

[91] For Flanders, see Stabel, 'Guilds', pp. 203–5; idem, 'Social mobility', p. 175. For the Netherlands, see Davids, 'Apprenticeship', p. 78. For Vienna, see Steidl, 'Silk weaver', p. 151. Not all corporate systems shared this characteristic; Ogilvie, 'Guilds, efficiency, and social capital', pp. 307–13. For completion rates, see n. 13 above.

[92] In this vein, both Clark, 'Condition', p. 1316, and van Zanden, 'Skill premium', p. 147, note that guilds do not appear to have been inflating wages.

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Footnote references

Acemoglu, D. and Pischke, J. S., 'Beyond Becker: training in imperfect labour markets', *Economic Journal*, 109 (1999), pp. F112–F142.

Alexander, J. M. B., 'The economic and social structure of the City of London, *c.* 1700' (unpub. Ph.D. thesis, Univ. of London, 1989).

Arkell, T., 'An examination of the poll taxes of the later seventeenth century, the Marriage Duty Act and Gregory King', in K. Schurer and T. Arkell, eds., *Surveying the people: the interpretation and use of document sources for the study of population in the later seventeenth century* (Matlock, 1992), pp. 142–77.

Ben-Amos, I. K., 'Failure to become freemen: urban apprentices in early modern England', *S,* *y*

Webb, C., *London livery company apprenticeship registers*, 48 vols. (1996–2005).
Webb, C., *An index to the Association Oath Rolls for the City of London 1696* (West Surrey Family History Soc. rec. ser., XL, 2006).
Winstanley, I., ed., *The diary of Roger Lowe of Ashton-in-Makerfield, Lancashire, 1663–1678. Including a record of burials at Winwick church, 1666–1671* (Wigan, 1994).
Wrigley, E. A., Davies, S. R., Oeppen, J. E., and Schofield, R. S., *English population history from family reconstitution, 1580–1837* (Cambridge, 1997).
Wrigley, E. A., *Poverty, progress, and population* (Cambridge, 2004).
Yarbrough, A., 'Geographical and social origins of Bristol apprentices, 1542–1565', *Transactions of the Bristol and Gloucestershire Archaeological Society*, 98 (1980), pp. 113–30.
van Zanden, J. L., 'The skill premium and the "great divergence"', *European Review of Economic History*, 13 (2009), pp. 121–53.

APPENDIX TABLE A1: SUMMARY STATISTICS FOR LONDON SAMPLE OF APPRENTICES, 1687–95

	(1) *All*	*(2)* *London or Middlesex origin*	*(3)* *Migrants*
Present in May 1695 (%)	49	47	50
Migrant	60	0	100
Parent deceased (%)	23	23	23
Parent citizen of London (%)	20	49	0.2
Parent gentleman (%)	12	5	17
Parent yeoman (%)	18	4	26
Parent husbandman (%)	4	0.3	6
Parent other agriculture (%)	1	1	1
Parent craft (%)	36	52	26
Parent distribution and sales (%)	13	24	7
Parent service (%)	7	9	5
Parent other professional (%)	7	4	10
Parent labourer (%)	2	1	2
Master Great Twelve company (%)	30	31	30
Master household of seven or more (%)	29	29	29
Master rich (%)	35	35	36
Master inside city walls (%)	52	50	54
N	685	272	413

Notes: See text for details of sample construction. The sample consists of apprentices bound in London between May 1687 and April 1695.

APPENDIX TABLE A2: SUMMARY STATISTICS FOR BRISTOL REGRESSION SAMPLE

	(1) *All*	*(2)* *Bristol*	*(3)* *Migrants*
Present in May 1696 (%)	54	59	50
Migrant (%)	52	0	100
Parent gentleman (%)	4	0.3	7
Parent yeoman (%)	8	1	14
Parent husbandman (%)	0.2	0	0.4
Parent other agriculture (%)	13	1	24
Parent craft (%)	46	60	33
Parent distribution and sales (%)	11	17	6
Parent service (%)	10	15	5
Parent other professional (%)	7	3	10
Parent labourer (%)	2	3	1
Master barber (%)	3	3	3
Master joiner (%)	2	2	3
Master carpenter (%)	2	3	2
Master merchant tailor (%)	2	2	2
Master baker (%)	3	2	3
Master cooper (%)	8	7	9
Master grocer (%)	3	2	4
Master merchant (%)	7	7	6
Master soapmaker (%)	5	4	5
Master weaver (%)	3	4	2
Master seafaring trade (%)	16	17	14
Master household of seven or more (%)	24	24	25
Master rich (%)	18	16	19
Master same occupation as parent (%)	9	16	1
N	1,341	646	695

Notes: See text for details of sample construction. The sample consists of apprentices bound in Bristol between Sept. 1688 and Aug. 1696.