

From orphan to artisan: apprenticeship careers and contract enforcement in The Netherlands before and after the guild abolition[†]

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Employing novel data on over 400 apprenticed orphaned boys from the Dutch cities of Leiden and Utrecht, this article explores the functioning of apprenticeship during and after the guilds. Although the mobility of apprentices was high and contracts were uncertain, no complaints arose from masters or guilds. Wages paid to these apprentices demonstrate that their labour made a gradually increasing contribution to the workshop from the start of their term. This enticed masters to take on apprentices and removed the need for contract enforcement. After the guilds were abolished, the number of apprenticed orphans in the crafts grew, suggesting that guilds previously hampered access to training. Additional data collected for regular (non-orphan) apprentices corroborates these findings.

Before the advent of vocational schools, on-the-job training through apprenticeships formed the main source of access to skilled jobs.¹ Over a fairly long period, adolescents worked for craftsmen in return for being taught their skills.² Such apprentices were very numerous; it has been estimated that they made up between 7.5 and 10 per cent of the English non-agricultural labour force in the eighteenth century.³ However, apprenticeships are important for more than their numbers alone. Given the importance of human capital formation, understanding how craftsmen obtained their skills is vital for explaining economic growth, and probably also the evolution of technology.⁴ Moreover, access to apprenticeships affected parents' decisions to invest in training, so it also determined opportunities for social mobility.⁵

The institutional setting of preindustrial skill formation in Europe is still contested. Epstein argued that guilds enforced contracts to overcome problems

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¹ De Munck and Soly, 'Learning on the shop floor', p. 6.

² Wallis, 'Apprenticeship and training'.

³ Humphries, 'English apprenticeship', p. 81.

⁴ Galor and Moav, 'From physical to human capital'; Mokyr, *Gifts of Athena*, pp. 259–60.

⁵ Klemp, Minns, Wallis, and Weisdorf, 'Picking winners?'; Minns and Wallis, 'Price of human capital'.

of mutual opportunism between masters and apprentices.⁶ Ogilvie claimed that apprenticeships were not needed for early modern skill formation at all because skills were relatively easy to learn, and that guilds acted as rent-seekers by using apprenticeships to restrict access to training.⁷ Recent contributions demonstrate that early modern apprentices dropped out in large numbers, suggesting that apprenticeships were not enforced by guilds at all.⁸

Evidence on how skill formation actually ensued during the course of one or more apprenticeships is still extremely limited.⁹ Many apprenticeship contracts were conducted privately, and notarial apprenticeship contracts and biographies may be biased. It therefore remains difficult to assess what actually happened on the shop floor.¹⁰ Did masters really adjust the working and training distribution to overcome the risk of early leaving, as has been proposed?¹¹ There is furthermore a great need for more empirical research to assess how guilds affected early modern skill formation. For instance, did guilds actually restrict access to early modern training? More case studies, when combined, may expose a broader pattern in early modern apprenticeship training.¹²

This article examines the functioning of early modern apprenticeship training by using novel data on apprenticed orphans from the Dutch cities of Leiden and Utrecht, combined with data on 'regular' apprentices. Dutch municipal orphanages kept detailed records when apprenticing orphans to local craftsmen. Data were collected on every apprenticeship during the eighteenth and nineteenth century for more than 400 boys. This allows us to follow apprentices over different masters and crafts, and their wages can be used to examine how training and working was actually distributed during the term. Because of the prolonged existence of Dutch orphanages, it is further possible to compare apprenticeship training during and after the Dutch guilds, thus singling out their effect.¹³ Supplementary records collected for hundreds of regular Dutch apprentices indicate that their apprenticeships resembled orphan apprenticeships. Consequently, this is the closest we can get to examine the functioning of Dutch apprenticeship training during and after the guilds.¹⁴

Before discussing the data in section II, section I will review different models of early modern apprenticeship training. Section III illustrates that apprentices served varying terms, were highly mobile, and that many contracts were short-term or not upheld. Section IV demonstrates that apprentices provided increasingly worthwhile labour from the start of their term, and that they were paid according to skill. Apprentices were thus a valuable asset for masters throughout their term. Section V argues that premiums were used to cover the additional costs of board and keep not fully covered by apprentices' labour, whenever apprentices were boarding with their master. Consequently, and in contrast to Epstein's model, contract enforcement was not required because masters were directly compensated through labour and

⁶ Epstein, 'Apprenticeship', pp. 688–93.

⁷ Ogilvie, 'Guilds, efficiency, and social capital', pp. 302–14.

⁸ Wallis, 'Apprenticeship and training'; Minns and Wallis, 'Rules and reality'.

⁹ Wallis, 'Apprenticeship and training', p. 848.

¹⁰ Mokyr, *Enlightened economy*, p. 118.

¹¹ Wallis, 'Apprenticeship and training', pp. 845–51.

¹² Ogilvie, 'Rehabilitating the guilds', p. 181.

¹³ Davids, 'Apprenticeship and guild control', pp. 72–4, 78. Cf. Humphries, 'Rent seeking', pp. 236–7.

¹⁴ The guilds considered in this article are all craft guilds. Merchant and shopkeepers' guilds are excluded.

premiums. By comparing the distribution of apprenticeships during and after the guilds, section VI shows that guilds may have reduced access to training. Section VII concludes.

I

The training models underlying most literature on early modern apprenticeship are derived from Becker.¹⁵ Because skills were transferrable across masters of the same craft, apprentices generally captured all profits from training in the form of future higher wages. Apprentices therefore needed to pay for training themselves.¹⁶ These costs would be the time spent on instruction, the use of materials and space, and possibly additional costs of board and keep.¹⁷ However, apprentices may have been unable to pay for these costs since returns were only captured afterwards. To resolve this, masters are thought to have advanced training costs.¹⁸ They recouped these investments by making the apprentice work for below-market wages for a specified period of time 'after gaining a set level of skills'.¹⁹ Both parties would thus commit themselves to a long-term contract. As mutual opportunism looms large, this is where contract enforcement comes in. An apprentice had little incentive to reimburse training costs and could leave for higher wages after his training was completed. This chance of default would cause a master to refrain from training, and to use the apprentice as a cheap labourer instead. In turn, this would discourage adolescents from taking an apprenticeship. Without contract enforcement an apprentice was therefore unsure whether he would be trained, while a master risked losing advanced training investments.

According to Epstein, a key task of craft guilds was that they enforced apprenticeship contracts, and by so doing ensured the success of early modern training.²⁰ Enforcing training and the following period of apprentices' labour ensured that masters could recoup their training costs retrospectively. Enforcement also made sure that apprentices actually received training.²¹ Different versions of this argument have since been put forward to explain the success of preindustrial training, and as a reason for the prolonged persistence of craft guilds throughout early modern Europe.²² Van Zanden suggested that guilds may have guaranteed an efficient training system, possibly explaining the low European skill premium.²³ Humphries argued that apprenticeships enforced by guilds and other mechanisms contributed to the departure of English labour out of agriculture.²⁴ It has also been stated that apprenticeships persisted in the nineteenth century because the legacy of guild custom favoured training certification and contract enforcement.²⁵

¹⁵ Becker, *Human capital*, pp. 7–18.

¹⁶ *Ibid.*, pp. 12–13.

¹⁷ Wallis, 'Apprenticeship and training', p. 836.

¹⁸ Humphries, 'English apprenticeship', p. 75; Hamilton, 'Decline', pp. 642–3; Smits and Stromback, *Economics of the apprenticeship system*, pp. 37–8.

¹⁹ Epstein, 'Apprenticeship', p. 691.

²⁰ *Ibid.*, pp. 688–93.

²¹ *Ibid.*, pp. 690–2.

²² Pfister, 'Craft guilds', pp. 14, 18; Lucassen, de Moor, and van Zanden, 'Return of the guilds'; Prak, Lis, Lucassen, and Soly, eds., *Craft guilds*.

²³ van Zanden, 'Skill premium', pp. 139–40.

²⁴ Humphries, 'English apprenticeship', p. 99.

²⁵ Elbaum, 'Why apprenticeship persisted'.

This reassessment of the significance of craft guilds for apprenticeships has nevertheless been challenged. Ogilvie argued that early modern crafts did not require many skills, and that guilds set arbitrary long terms and controlled access to training only to uphold their monopolies.²⁶ High levels of attrition in early modern England suggest that guilds were unable or unwilling to enforce contracts altogether.²⁷ Wallis proposed that this was not an issue because training and working may have occurred in tandem.²⁸ Training investments were recouped almost directly if apprentices worked from the start of their term in exchange for training. A master would then not incur a large loss when apprentices left early.²⁹ This explanation would fit with the high levels of attrition among apprentices found throughout early modern Europe.³⁰

It has been difficult to test these different interpretations. There are no data to examine whether working and training actually occurred in tandem. Moreover, apprenticeships in the Württemberg worsted industry, used by Ogilvie, may not be representative for early modern skill formation.³¹ It is also unknown what happened to most apprentices after they left their first master.³² Novel data on apprenticed Dutch orphans allows us to evaluate these debated characteristics of early modern apprenticeship more closely. These data will be introduced first.

II

Dutch orphan apprenticeships were largely comparable to regular apprenticeships. Parents and regents of orphanages both tried to ensure a future career in the craft for adolescent boys.³³ Municipal orphanages did this to prevent downward social mobility. Admittance to these orphanages was generally restricted to children of late citizens (*poorters*), who often originated from the group of craftsmen. As McCants has demonstrated, the municipal orphanage of Amsterdam explicitly aimed at securing craft apprenticeships for male orphans.³⁴ Other Dutch orphanages also used apprenticeships to ensure that male orphans could become craftsmen like their late parents.³⁵ The municipal orphanages of Leiden and Utrecht were no exception.³⁶ Although the large textile industry of Leiden apprenticed

²⁶ Ogilvie, 'Rehabilitating the guilds'; eadem, 'Can we rehabilitate the guilds?'; eadem, 'Guilds, efficiency, and social capital'.

²⁷ Minns and Wallis, 'Rules and reality', pp. 561–7.

²⁸ Wallis, 'Apprenticeship and training', pp. 845–6.

²⁹ Ibid., pp. 846–7.

³⁰ Ben-Amos, 'Failure to become freemen', p. 167; De Munck, *Technologies*, pp. 187–90; Sonenscher, *Work and wages*, pp. 109–11.

³¹ Epstein, 'Craft guilds in the pre-modern economy', pp. 168–71.

³² De Munck, *Technologies*, pp. 28–9, 45.

³³ van der Vlis, *Weshuizen in Nederland*, pp. 32–3. The term 'regents' refers to heads of public organizations and to the Dutch urban ruling elite (*regenten*). Generally the two overlapped because the ruling elite was in charge of charitable institutions such as orphanages as well.

³⁴ McCants, *Civic charity*, pp. 63–4.

³⁵ Van der Vlis, *Van wezen tot zijn*, pp. 97–103; Groenveld, Dekker, Willemse, and Dane, *Wezen en boeffes*, pp. 62–3, 210. Higher classes often took care of orphans within their own circle: McCants, 'Poor consumers', p. 182.

³⁶ Het Utrechts Archief, Utrecht (hereafter HUA), Archief Gereformeerd Burgerweeshuis, inv. 47–3, fo. 199r; Wiel, *Dit kint hiet Willem*, pp. 65–6, 73.

orphans as well, its decline after about 1700 pushed regents to also secure craft apprenticeships.³⁷

Sources demonstrate that orphans received apprenticeship training just like regular apprentices. All 12 Leiden orphans who were apprenticed at glassmakers between 1754 and 1782 appear in the guild's apprenticeship list exactly when the orphanage stated them to be apprenticed there.³⁸ The Utrecht orphan Jan Dirk Bresser appears in the apprentices' book of the Utrecht surgeons' guild at the same time as his apprenticeship was recorded by the orphanage.³⁹ The apprenticeship ledger of the Amsterdam coopers' guild from 1722–85 lists the apprenticing of orphans alongside regular apprentices.⁴⁰ In all observable cases orphans agreed to the same terms as regular apprentices. Moreover, several orphans did eventually become masters.⁴¹ Individual notes further signal that training was provided. For instance, Leiden master sculptor Krul 'at his expense' agreed to teach drawing to orphan Cornelis Bavelaar in 1764.⁴²

In some ways orphan apprenticeships may have been unlike regular apprenticeships, but these differences are probably not sizeable. Regents could have invested less time in searching and matching because orphans needed to bring in wages.⁴³ Orphan apprentices may therefore have changed masters more often. However, changing crafts or dropping out led to lower wages, which was not in the interest of regents. Moreover, it has been demonstrated that regular apprentices also changed masters.⁴⁴ Drop-out rates of around 21 to 28 per cent for orphans are perhaps lower than those of regular apprentices, presumably because their only exit options were boarding a ship to the Indies or running away.⁴⁵

Staying at the orphanage did not affect apprenticeship terms. Orphans were legally required to stay at the orphanage until they reached the age of 25 in the eighteenth century and the age of 21 during the nineteenth century.⁴⁶ The interval between completing an apprenticeship and leaving the Leiden orphanage was on average 1.7 years in the eighteenth century and 1.8 years in the nineteenth century, demonstrating that many orphans continued to work as journeymen or masters while living at the orphanage.⁴⁷ In both periods several orphans were allowed to stay at the orphanage to finish their apprenticeship. The same applies to the Utrecht orphanage, where orphans left at the age of 23.6 on average. Age of entering the orphanage did not affect apprenticeship terms. In the eighteenth century most orphans arrived around the age of eight, but they were not apprenticed until the

³⁷ Wiel, *Dit kint hiet Willem*, p. 93; Posthumus, *Geschiedenis*, pp. 129, 1099; van Nederveen Meerkerk, *Draad in eigen handen*, p. 271. This makes a comparison with seventeenth-century orphan apprenticeships unfeasible.

³⁸ Regionaal Archief Leiden, Leiden (hereafter RAL), Archief gilden, inv. 524, book II.

³⁹ HUA, Archieven, bewaard bij het stadsbestuur van Utrecht, behorend aan de stad (Archieven stadsbestuur I), inv. 105.

⁴⁰ Stadsarchief Amsterdam, Amsterdam (hereafter SAA), Archief van de gilden en het brouwerscollege, inv. 895.

⁴¹ RAL, Archief Heilige Geest Weeshuis (hereafter HGW), inv. 3875 (incomplete).

⁴² RAL, HGW, inv. 3855, master Krul.

⁴³ Wiel, *Dit kint hiet Willem*, p. 46.

⁴⁴ De Munck, 'Construction and reproduction', p. 101; Minns and Wallis, 'Rules and reality', pp. 568–9.

⁴⁵ Humphries, *Childhood and child labour*, p. 261 (lower bound estimate); Sonenscher, *Work and wages*, pp. 109–11.

⁴⁶ Wiel, *Dit kint hiet Willem*, pp. 66, 118; RAL, HGW, inv. 26.

⁴⁷ RAL, HGW, inv. 33, fo. 1r.

age of 14. In the nineteenth century most orphans arrived around the age of 12 and usually were not apprenticed until they were 15.

Apprenticeship careers were reconstructed by linking all consecutive apprenticeship contracts of individual orphans.⁴⁸ For every apprenticeship contract, their craft, weekly wages, name of the master, and the term in years are known.⁴⁹ The apprenticeship careers were manually linked to enrolment registers to obtain age of entry to and exit from the orphanage, and age at the beginning and end of the apprenticeship career.⁵⁰ Enrolment registers further stated whether an apprenticeship career was successfully completed when the orphan left the orphanage, or if it had been terminated for another reason, such as running away or being sent to the Indies because of misbehaviour.⁵¹ For Leiden the data cover the periods 1754–82 and 1829–46. The Utrecht data are from the periods 1778–93 and 1865–79. Both cover apprenticeships with and without guild control because the Dutch craft guilds were abolished around 1820.⁵²

Some apprenticeships may have started before being observed in the ledgers. At the municipal orphanage of Amsterdam first-year wages did not exceed 12 *stuivers* a week (one *stuiver* is 0.05 *guilder*).⁵³ The Leiden regents also stated that starting wages were about 12 *stuivers* at most until 1763.⁵⁴ Starting wages of regular Leiden glassmakers' apprentices did not exceed 12 *stuivers*.⁵⁵ A maximum weekly first-year wage of 12 *stuivers* has therefore been used to identify the beginning of apprenticeship training. Apprenticeship careers of orphans leaving the orphanage after 1782 and 1846 for Leiden, and 1793 and 1879 for Utrecht, are omitted because they may have continued their training. After these corrections there are 141 apprenticeship careers for Leiden during 1754–82, 223 for Leiden during 1829–46, and 65 and 52 respectively for the two periods in Utrecht.

These numbers may appear relatively small, but the benefit is that orphaned apprentices, and their earnings, can be traced over several masters. Moreover, much more numerous observations collected for regular apprentices presented below demonstrate that the patterns found for orphans closely resemble regular apprenticeships. Whenever specific elements of orphan apprenticeships are examined, instead of full careers, it is at times possible to use more agreements. This increases the number of apprentices to over 700 in total, or more than 1,500 contracts.

The distribution of the first apprenticeships of eighteenth-century Leiden and Utrecht orphans can be seen in table 1, grouped by HISCO minor groups.⁵⁶

⁴⁸ If an orphan appeared at another master before completing the years recorded at a previous master, the first agreement is considered to have been terminated early. Cross-checking orphanage minutes, enrolment registers, and available guild records confirms this.

⁴⁹ RAL, HGW, inv. 3855, inv. 3862; HUA, Archief Gereformeerd Burgerweeshuis, inv. 769-2, inv. 772-1.

⁵⁰ RAL, HGW, inv. 3390, inv. 3392; HUA, Archief Gereformeerd Burgerweeshuis, inv. 723-1. More than 94% of apprenticed orphans were linked to enrolment registers. Mismatching is unlikely because complete names were recorded and dates of birth are known.

⁵¹ Successful completion entailed that orphans were given their savings at departure, which was stated in enrolment registers.

⁵² The Dutch guilds were first formally abolished during the French period but only truly disappeared around 1820; Wiskerke, *Afschaffing*, pp. 205–8.

⁵³ McCants, *Civic charity*, p. 79.

⁵⁴ This is confirmed by RAL, HGW, inv. 34, fo. 2r.

⁵⁵ RAL, Archief gilden, inv. 524, book II.

⁵⁶ Leeuwen, Maas, and Miles, *HISCO*.

Table 1. *First apprenticeships of Leiden and Utrecht orphans*

<i>HISCO minor group</i>	<i>Leiden</i>		<i>Utrecht</i>
	<i>1754–62</i>	<i>1763–73</i>	<i>1778–93</i>
Textile workers			
Thread winders	35	1	-
Ribbon workers	17	-	-
Wheel turners	4	-	-
Weavers	1	3	1
Other	3	3	-
Cabinetmakers and related woodworkers	6	24	9
Glass formers, potters	2	5	6
Sculptors, painters, and related creative artists	3	4	6
Jewellers and precious metal workers	-	5	5
Production and related workers not elsewhere classified	1	4	1
Tailors, dressmakers, sewers, upholsterers	1	3	5
Bricklayers, carpenters, and other construction workers	2	2	18
Salesmen, shop assistants	2	-	-
Other	3	7	14
Total	80	61	65
Average first apprenticeships annually	8.9	5.5	4.1

Sources: RAL, HGW, inv. 3855, inv. 3390; HUA, Archief Gereformeerd Burgerweeshuis, inv. 769-2, inv. 723-1.

The period 1763–73 is listed separately for Leiden, because from 1763 onwards the regents decided to prefer craft apprenticeships over apprenticeships at the Leiden textile industry.⁵⁷ The table consequently shows that previously most orphans started at textile apprenticeships, with a more diversified picture emerging afterwards. Mirroring findings by McCants, apprenticeships in common crafts dominated presumably because access to high-end crafts was relatively limited for orphans.⁵⁸ This should be considered an advantage because these apprenticeships are usually difficult to trace through other sources, while numerically they were much more significant. Most craft apprenticeships were in woodworking, such as cooping, chair making, and cabinet making. Some orphans from Leiden and Utrecht nonetheless did secure high-end apprenticeships, with art painters, gold- and silversmiths, and sculptors.

III

Subsequent apprenticeship careers and successful completion partly depended on these first apprenticeships. Apprenticeships of Leiden orphans indicate that textile apprenticeships were not favoured. More than half of all 67 Leiden orphans who started in textiles eventually moved to an apprenticeship in a guild-controlled craft. Moving the other way happened only twice. It seems that the regents placed orphans in textiles just to wait until an apprenticeship in the crafts was available. Perhaps only talented orphans were placed in the crafts directly. More than 70 per cent of orphans who stayed in textiles quit their apprenticeship by, for instance, running away or boarding a ship to the Indies. Conversely, only 28 per cent

⁵⁷ RAL, HGW, inv. 34, fo. 2r.

⁵⁸ McCants, *Civic charity*, pp. 70–1.

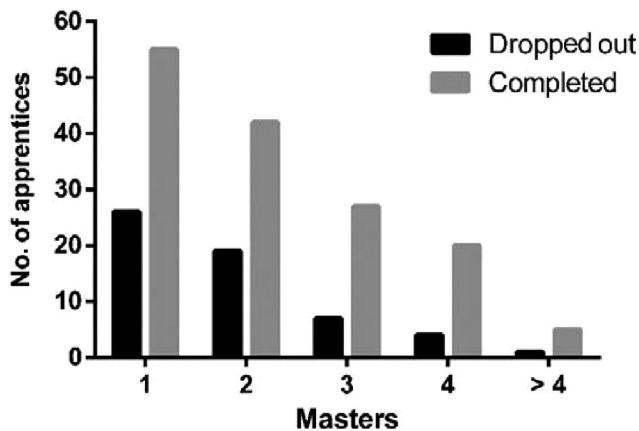


Figure 1. *Number of masters during the apprenticeship careers of orphans from Leiden (1754–82) and Utrecht (1778–93)*

Note: The distribution of masters per orphan did not significantly differ between Leiden and Utrecht; χ^2 (4, $n = 206$) = 5.849, $p > 0.05$. The dates for Leiden in fig. 1 are different from tab. 1 (1763–73) because tab. 1 refers to starting years, whereas fig. 1 refers to complete apprenticeship careers.

Sources: See tab. 1.

of apprentices who ended up in the crafts quit their apprenticeship.⁵⁹ Moreover, having been apprenticed in textiles did not reduce subsequent apprenticeship careers in the crafts. This suggests that skills obtained in textiles were of little use in the crafts. The second-rate position of textiles is further shown in orphanage minutes. In 1780 the directors of the Leiden *lakenhal* asked the regents whether they would be keen to place girls as thread winders.⁶⁰ The regents replied that they would only consider this when all other options had failed.⁶¹

The mobility of apprentices was nonetheless high outside the textile industry as well. Also within craft apprenticeships orphans moved masters often. As can be seen in figure 1, a large number of apprenticeship careers in Leiden and Utrecht were not confined to one master. More than 60 per cent of all apprentices switched master at some point during their apprenticeship career. Half of all orphans who successfully completed their apprenticeship were apprenticed to more than one master. Also more than half of all Leiden orphans who started in the crafts switched masters at least once. One in three apprentices starting in the crafts even moved between crafts. Apprentices moving from textiles to crafts still habitually changed masters afterwards. Changing apprenticeships was thus not solely prompted by masters wanting to get rid of unwilling or less talented apprentices, but seems to have been common for all orphans.

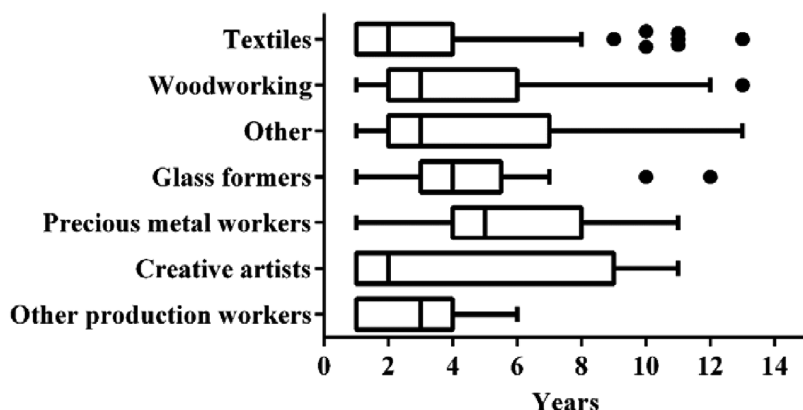
Switching masters during an apprenticeship career did not occur at set points. Served terms were highly diverse within all crafts. Figure 2 shows that terms varied anywhere between one and 12 years, even within the same craft. These did not significantly change when only successful apprentices are considered. Textile

⁵⁹ Whether this had to do with individual capabilities or with harsh working conditions at textile apprenticeships cannot be inferred.

⁶⁰ Posthumus, *Bronnen*, vol. 6, pp. 255–7.

⁶¹ *Ibid.*, p. 257.

A. Leiden, 1754–82 (n = 311)



B. Utrecht, 1778–93 (n = 118)

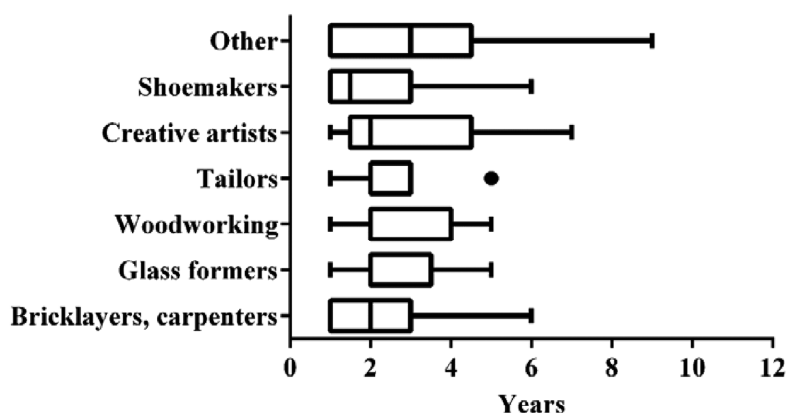


Figure 2. *Distribution of served apprenticeship terms by occupational group*

Sources: See tab. 1.

apprenticeships, as expected, had short terms, but apprentices of creative artists and other craft workers also served short terms. Moreover, no individual craft or master applied uniform terms. For instance, Leiden chair maker Graaff apprenticed four orphans between 1754 and 1769. These stayed for 1, 2, 6, and 13 years each. Tanner Haar apprenticed one boy for three years, and another for 10 years, between 1767 and 1771. Figure 2, panel B, demonstrates that in Utrecht too, the terms served were far from uniform. Here as well, terms per master varied. Even if only successful apprenticeships are considered, Utrecht glassmaker Eskes apprenticed boys for terms varying from one to four years. Utrecht carpenter Adams apprenticed orphans for two, three, and six years.

The level of contract breach can signify whether these diverse terms and high levels of mobility resulted from variation in contracts, because contracts were not enforced, or both. In Leiden apprenticeship terms were sometimes agreed upon at the outset, but it was also common to extend the apprenticeship annually.

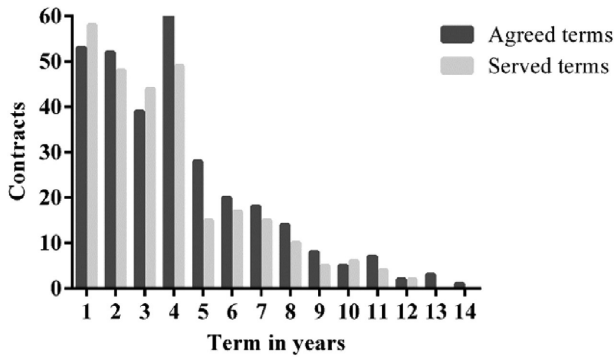


Figure 3. *Agreed terms and terms served of Leiden orphans apprenticed at crafts, 1754–82*

Sources: RAL, HGW, inv. 3855, inv. 3390.

The former certainly occurred, since many orphans were apprenticed to another master before their previous term ended. These ‘missing years’ can be used to estimate contract breach. However, the large number of one-year apprenticeship contracts, both in textiles and the crafts, signals that rolling-over was common as well. Any differences between terms agreed in the ledger and actual terms served thus underestimates the actual levels of contract breach.

Figure 3 compares agreed terms for Leiden orphans apprenticed in the crafts with actual terms served. For example, there were 60 four-year contracts in the ledger, but only 49 apprenticeships actually lasted four years. In addition, several five-year contracts only lasted one or three years. Some of these longer contracts became shorter-term contracts, which explains why there are more one- and three-year terms served than originally agreed. The figure demonstrates that more than 25 per cent of contracts with terms of four years and over were breached. At least 22 per cent of *all* apprenticeship contracts were breached. The figure further shows that demand for long-term contracts was limited to begin with. Almost half of all agreed contracts had terms of three years and under. The large number of agreed one-year contracts further signals that many masters considered annually whether to prolong the apprenticeship. In Utrecht contracts with orphans were always annually renegotiated. Every year these masters would state for how long they would hire the orphan, and very few masters ever agreed to terms exceeding one year.

Data on regular apprentices illustrates that these high levels of contract breach and mobility were not exclusive to orphans. An apprenticeship ledger of the Amsterdam pig butchers’ guild from 1787 to 1811 contains precise references to apprentices quitting early.⁶² Of all 517 registered apprentices, at least 178 dropped out. In addition, about 12.5 per cent of them can be traced to more than one master. Arent Menger from Germany was even apprenticed at seven masters before completing his apprenticeship in 1795. Only about 30 per cent of apprentices formally finished their training in this guild. An apprenticeship list of

⁶² SAA, Archief gilden, inv. 1470.

the Utrecht surgeons' guild also states whether an apprentice had left early, albeit with some intervals. After excluding years of possible under-recording, this list shows that between 1740 and 1793 at least 12 per cent of apprentices breached their contract. Here too, approximately 12 per cent switched masters, and less than 10 per cent of non-masters' sons became masters.⁶³

At the Leiden glassmakers' guild, masters were allowed only one apprentice consecutively from 1658 onwards.⁶⁴ Of all 332 glassmaking apprentices registered between 1744 and 1790, more than 50 began before a previous apprentice had finished his contractual term.⁶⁵ Several notes explicitly state that these previous apprentices had left early, or had switched masters.⁶⁶ Early leaving of Leiden orphans apprenticed to these master glassmakers can also be observed, since the guild list matches the orphanage records.⁶⁷ Together this indicates that 16 per cent of these contracts were breached. Because breach cannot be observed when no subsequent apprentice was hired directly, this is again an underestimation.

These findings for orphans and regular apprentices are difficult to square with the two-stage model. How could training investments have been recouped retrospectively if terms were short and diverse, training was spread over several masters, and many apprentices could not be made to stay? While the regents of orphanages could have acted as third-party enforcers and encouraged compliance, the large variation in terms and high levels of contract breach indicate that they were either unable or unwilling to enforce apprenticeships. Also, why would many masters in all sorts of crafts prefer short-term contracts if training investments were recouped only in the long run? The next section presents apprentices' wages to argue that apprentices immediately proved to be an asset to masters, because of the labour they provided. This significantly reduced the need to recoup training investments afterwards.

IV

Apprentices' wages can be used to examine how productivity ensued during the term. Was training followed by a period of cheap labour to compensate masters for advanced training costs, as Epstein argued, or was the observed unenforceability resolved by distributing working and training differently? Apprenticeship wages are rare in the literature, probably because masters regularly provided board and keep instead of wages.⁶⁸ It has therefore been difficult to evaluate whether apprentices trained and worked simultaneously or successively. Dutch orphans did not board but returned to their orphanage every evening. Because this removed the costs of board and keep, orphans received wages during their apprenticeship. These wages were partly used by the orphanage for board and keep, and were partly set aside as individual savings.

⁶³ HUA, Archieven stadsbestuur, inv. 105.

⁶⁴ RAL, Archief gilden, inv. 515.

⁶⁵ RAL, Archief gilden, inv. 524, book II.

⁶⁶ Notes of apprentices Abraham Aarnoute; Karel Derwijn; Elias Leget; Jacobus van Rooyen; Johannes van Simonsbergen; Nicolaas Springer; Pieter Beitel; Adrianus Stephanus Longepe.

⁶⁷ For example, orphan Rengelen stayed one year while four years were agreed. Johannes de Bruyn stayed for three years where four were agreed. After three years this master apprenticed a new boy. Also Abraham Aarnoute quit early and was immediately succeeded by Casper Pittenaar.

⁶⁸ De Munck and Soly, "Learning on the shop floor", p. 21; de Kerf, 'Circulatie van technische kennis', p. 47.

The apprenticeship models of Epstein and Wallis would arguably have resulted in different earning profiles. In Epstein's model, working follows training, and apprentices are not able to pay for training costs directly. These are therefore advanced by the master.⁶⁹ This would result either in a pay scale with no wages at all during training, or in a constant wage being advanced by the master to provide subsistence. Training costs and possible subsistence wages are then reclaimed retrospectively by labour provided by the apprentice. As a result, after training, apprentices' wages would remain relatively flat or may have been absent, because masters need to appropriate the margin between wages and productivity to recoup training costs. Since masters reclaim training costs by paying below-market rates, apprentices' wages are always below marginal productivity.⁷⁰

According to Wallis, the uncertainty of contracts may have been resolved by making apprentices work for their master from the beginning of the term. Masters may not have invested much time and effort in training because of the risk of opportunism, or perhaps because training was 'quick and simple'.⁷¹ Masters instead began by assigning menial tasks to new apprentices. Through learning-by-doing, imitating, and observing, apprentices would gradually acquire skills on the job, while at the same time providing labour.⁷² If this interpretation of early modern training is correct, we would expect that non-boarding apprentices earned gradually increasing wages, as their labour became more valuable over the term. Moreover, because masters provided little direct training, apprentices would have been paid close to their marginal productivity—in other words, close to market rates.

Both interpretations of early modern training can be tested using wages of apprenticed orphans from Utrecht and Leiden during the eighteenth century. Table 2 gives the average weekly wages per group of apprentices. Three observations stand out. First, all these non-boarding apprentices received wages from the start of their term. Apparently the labour provided by apprentices exceeded any training investments from the very start. Apprentices were thus capable of making a decent contribution to the workshop of their master immediately. Second, their earning profiles show an annual increase instead of being flat, suggesting that skills increased gradually. Third, switching masters within the same craft hardly affected wages, but switching between crafts led to lower wages. Masters within the same craft were thus willing to pay relatively more when taking on apprentices who already had experience in the particular craft, whereas apprentices without experience were placed at a lower point in the pay scale. This further indicates that apprentices were paid according to skill levels.

For example, when Leiden orphan Huybert de Jong switched from thread winding to map making in 1764, his wage dropped from 20 to 8 *stuivers*. It took de Jong another four years to reach his former wage level again. Conversely, Johannes de Jong had been apprenticed by silversmith Sas for four years, but this master explicitly did not want to prolong the agreement in 1771.⁷³ Johannes had to find another silversmith to continue his training. From this new silversmith Johannes

⁶⁹ Epstein, 'Apprenticeship', pp. 690–1.

⁷⁰ *Ibid.*, p. 691.

⁷¹ Wallis, 'Apprenticeship and training', p. 847.

⁷² *Ibid.*, pp. 848–9.

⁷³ RAL, HGW, inv. 34, fo. 202v [102v].

Table 2. *Average weekly wages of apprenticed orphans, in stuivers**A. Leiden, 1754–82*

<i>Term</i>	<i>Crafts, one master</i>	<i>One craft, multiple masters</i>	<i>Multiple crafts</i>	<i>Textiles</i>	<i>Textile vs. craft wage</i>
1	7.15	7.51	8.08	11.69	154%
2	9.92	10.26	10.43	12.39	121%
3	12.46	13.00	12.59	14.23	112%
4	15.62	16.38	15.29	15.88	101%
5	19.18	19.43	17.75	17.05	91%
6	24.29	23.25	20.78	18.90	83%
7	25.80	27.00	24.13	21.47	84%
8	28.60	30.25	28.00	25.50	88%
9	37.75	37.71	32.95	28.31	78%

B. Utrecht, 1778–93

<i>Term</i>	<i>Crafts, one master</i>	<i>One craft, multiple masters</i>	<i>Multiple crafts</i>
1	4.31	4.69	4.42
2	5.92	6.50	5.08
3	8.25	9.31	6.67
4	11.69	13.73	9.75
5	14.50	18.14	12.11
6	23.80	23.82	13.00

Notes: The last col. in panel A is calculated using the average of all craft wages.

Sources: See tab. 1.

immediately received higher wages because of his acquired skills. Comparable examples can be found for many apprenticed orphans from Leiden and Utrecht. If masters were providing mere subsistence through wages, or if they were using deferred compensation to discourage mobility, paying a higher wage to start with would make little sense.

These findings strongly suggest that early modern training should not be seen as consisting of two stages. Instead, apprentices provided valuable labour from the start of their term. Through informal training and learning by doing, they gradually picked up skills at little direct cost to masters. As a result their labour exceeded training costs immediately, explaining why all apprentices received wages from the start. Because apprentices became more productive with every year they stayed in the same craft, their wages increased accordingly. At the same time masters never stood to lose much when apprentices quit. This arrangement may not have been fundamentally different from a standard labour market for young workers, where wages also increase relatively rapidly during the first years of work.⁷⁴ Boot has presented comparable pay scales for young cotton factory workers in nineteenth-century England.⁷⁵

That increasing skill levels were driving the pay scale also becomes clear when comparing wages between Leiden textile and craft apprenticeships (table 2, panel A). Workers in the Leiden textile industry by and large did not need a lot of skills to become productive.⁷⁶ Thread winding, the dominant occupation in

⁷⁴ Murphy and Welch, 'Empirical age-earnings profiles', pp. 206–10.

⁷⁵ Boot, 'How skilled', pp. 285–7.

⁷⁶ van Nederveen Meerkerk and Schmidt, 'Wage labor', pp. 723–4.

textiles for Leiden orphans, could be picked up relatively quickly.⁷⁷ Because little training was required, starting wages in textile apprenticeships were relatively high. However, from about the fourth year, the wages of craft apprentices structurally surpassed those of textiles. Apprentices in the crafts needed relatively more time to become productive but picked up more skills in the long run, which resulted in higher wages.

The regents of the Leiden orphanage already knew this. When in 1763 they decided to place orphans in 'better crafts', the regents explicitly stated that this came at the cost of having to accept lower first-year wages,⁷⁸ but since more skills were picked up in the crafts, these apprentices gradually became more productive and received relatively higher wages in the long run.⁷⁹ The regents in 1763 therefore deliberately chose lower starting wages to ensure a better future livelihood for their orphans. It thus seems unjustified to argue that all early modern crafts needed little skill, based on an examination of textile apprenticeships alone.⁸⁰

Among craft apprenticeships too, wages were related to skills. Leiden orphans around the age of 14 who began their apprenticeship in carpentry on average earned about 7.6 *stuivers* a week, while their counterparts at silversmiths earned six *stuivers*. Utrecht orphans apprenticed to sculptors, painters, and printers also structurally earned less than apprentices in arguably easier crafts, such as carpenters and coopers. This further suggests that wages were based on the productive capacities of apprentices, and were not an advance that had to be reimbursed afterwards.⁸¹ In the latter case masters should arguably have paid uniform wages to apprentices at the same stage of training, regardless of the craft. McCants also noted that wages of apprenticed Amsterdam orphans in the seventeenth and eighteenth centuries were determined by their skill levels.⁸²

These patterns were not exclusive to orphans alone. Reith has already demonstrated that many regular apprentices in the more common crafts in eighteenth-century Germany and Austria earned increasing wages from the start as well, since they too helped in the production process from the beginning.⁸³ This was no different in the Dutch Republic. Guild records of the Leiden glassmakers' guild and the Amsterdam coopers' guild contain wages of several hundred regular apprentices. Notes in both ledgers point out that it is likely that these apprentices did not board at their masters, just like orphans.⁸⁴ Both crafts were relatively common and can therefore be compared to the crafts where orphans were apprenticed.

Figure 4 compares the average weekly wages of these two groups of regular apprentices to orphans, while with their first master. Wage scales were remarkably similar between these groups of apprentices. Wages of Leiden orphans and Leiden glassmaking apprentices were not even significantly different during the period

⁷⁷ van Nederveen Meerkerk, *Draad in eigen handen*, p. 274; Posthumus, *Geschiedenis*, vol. 3, pp. 635–6.

⁷⁸ RAL, HGW, inv. 34, fo. 2r.

⁷⁹ A comparable wage differential is reported in van Nederveen Meerkerk, 'Market wage', p. 174.

⁸⁰ Cf. Ogilvie, 'Guilds, efficiency, and social capital', pp. 302–14; eadem, 'Rehabilitating the guilds', p. 177.

⁸¹ van Nederveen Meerkerk and Schmidt, 'Tussen arbeid en beroep', pp. 42, 45; Tump, 'Ambachtelijk geschoold', pp. 169–75.

⁸² SAA, Weeshuis en Oudemannen- en -Vrouwenhuis der Evangelisch-Lutherse Gemeente, inv. 99; McCants, *Civic charity*, pp. 79–81.

⁸³ Reith, 'Apprentices'.

⁸⁴ SAA, Archief gilden, inv. 895, fo. 18v, 31r, 68v; RAL, Archief gilden, inv. 524, Book I, fo. 449r.

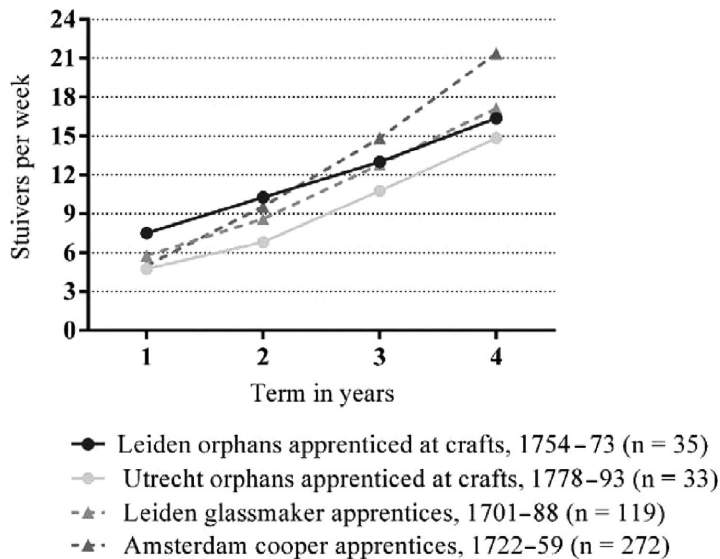


Figure 4. *Average weekly wages of apprentices at their first master*

Notes: A maximum first-year wage of 12 *stuivers* has been used to identify beginning apprentices. Wages of all groups were constant throughout their period of observation.

Sources: For orphans, see tab. 1. Regular apprentices from RAL, Archief Gilden, inv. 524; SAA, Archief Gilden, inv. 895.

1754–73. The higher wages of Amsterdam coopers' apprentices in the fourth year are caused by relatively large differences within this group of apprentices. Perhaps at this point skills between coopers' apprentices had diverged substantially, which is not surprising considering the number of observations.

It could still be argued that gradually increasing wages can fit Epstein's model as long as wages were structurally below marginal productivity. In that case masters might still have been able to reclaim training costs and advanced wages retrospectively through cheaply provided labour. This can be examined by comparing wages of experienced apprentices to those of journeymen. As experienced apprentices no longer required much training, their skills should have been comparable to those of journeymen; but if masters were paying experienced apprentices below-market wages to recoup training investments, their wages should have been significantly lower than those of journeymen.

Figure 5 compares the maximum wages earned by beginning and more experienced apprentices to wages of journeymen in the Amsterdam coopers' guild. Experienced apprentices are identified by a minimum wage of 13 *stuivers*. The figure shows that the wages of experienced apprentices and journeymen converged. This corresponds to the Leiden glassmakers' guild, where the wages of journeymen often started at the level of experienced apprentices as well.⁸⁵ There was thus no scope for masters to recoup training investments retrospectively.⁸⁶ Since wages increased

⁸⁵ RAL, Archief gilden, inv. 524, Book I, fos. 109, 324, 331, 347, 368.

⁸⁶ There was more variation in Amsterdam and Leiden journeymen's wages than has been noted in the literature, which primarily uses institutional builders' wages; de Vries and van der Woude, *First modern economy*, ch. 6. Accounting for life-cycle effects and occupational groups may call for an adjustment of early modern wage series; Blondé and Hanus, 'Beyond building craftsmen', p. 201.

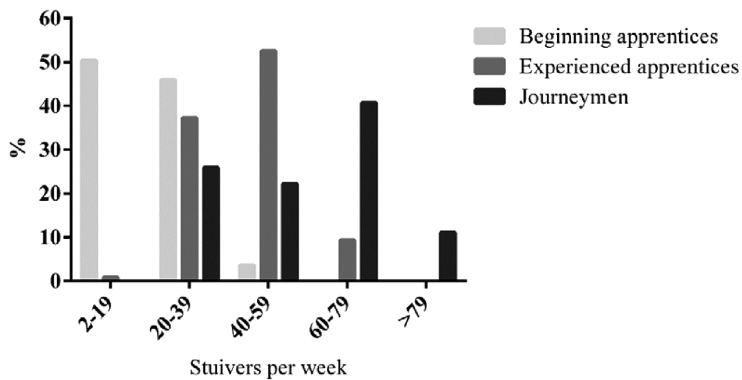


Figure 5. *Maximum wages of apprentices and journeymen of the Amsterdam coopers' guild, 1722–59*

Notes: See fig. 4.

Source: SAA, Archief Gilden, inv. 895.

right from the beginning of the apprenticeship, there was also little room to recoup any investments earlier. This again strongly suggests that masters did not recoup training investment retrospectively. Because apprentices' labour exceeded training costs from the start, masters instead paid wages close to marginal productivity throughout the term.

Consequently, it seems that Dutch apprenticeships were adapted to the earlier observed unenforceability and uncertainty of apprenticeship contracts.⁸⁷ High mobility and early leaving were less of an issue because masters stood to lose little at any point during the term. As Wallis suggested, making apprentices work would have extended their terms, but it also reduced the risk of opportunism and provided an incentive for masters to take on apprentices.⁸⁸ Apprentices themselves could quit relatively easily if training was underprovided or if the master or craft did not suit them. Also regents terminated apprenticeships when training was underprovided, for instance when they decided no longer to apprentice orphans to master cartwright Bronckhorst and master carpenter Noort.⁸⁹ At the same time this system made it possible to let apprentices go when they proved to be ill-suited, as was the case when Isaac Corse was fired by Leiden silversmith Fortman.⁹⁰ Notes suggest that masters also regularly breached apprenticeship contracts themselves.⁹¹

As to be expected under these conditions, complaints about the lack of enforcement were largely absent. During 1754–82 only one of all 555 contracts was tried and then upheld by the Leiden regents. The case concerned an apprenticed thread winder who in 1766 had insulted his master.⁹² After apologies the master still refused to take back the orphan. Due to arbitration the master had to apprentice the

⁸⁷ A comparable pay scale was used in nineteenth-century apprenticeships to mitigate problems of enforceability; Hamilton, 'Decline', pp. 650–3.

⁸⁸ Wallis, 'Apprenticeship and training', pp. 848–9.

⁸⁹ RAL, HGW, inv. 3855, notes at master Bronckhorst, master carpenter Noort. Also RAL, HGW, inv. 35, fo. 60r.

⁹⁰ RAL, HGW, inv. 3855, notes at master Fortman. Cf. RAL, HGW, inv. 34, fo. 196r [96r].

⁹¹ RAL, HGW, inv. 3855, master Linsel, chair maker, master carpenter Kerkhoven.

⁹² RAL, HGW, inv. 34, fo. 39v.

boy again. The orphanage minutes only contain one other reference to contract arbitration between 1744 and 1792. It is telling that both cases were initiated because regents demanded outstanding wages, and not because masters wanted to enforce contracts. Resorting to arbitration to solve apprenticeship disputes was probably uncommon in general. In 1664 only seven out of 3,000 Leiden arbitration cases related to contract breach, and it is likely that these cases concerned journeymen rather than apprentices.⁹³

Guilds and masters were simply not preoccupied with enforcing contracts. Even though many apprenticeships ended abruptly and prematurely, masters never complained about losing their apprentices. It is likely that the Leiden regents would have recorded conflicts with masters or guilds, considering the high level of detail in their minutes. Yet conflicts over contracts instigated by masters are completely absent. Moreover, only two out of 90 craft masters appearing before the Leiden regents between 1754 and 1782 added an annulment clause because the orphan had physical disabilities.⁹⁴ All other masters did not see the need for such clauses but still took little issue when their apprentices left early, and even sent them away on their own behalf. The same applies to regular apprentices. Amsterdam cooper Abraham van der Hoeven fired apprentice Jacob Stompe because of disobedience after two years in 1784, where four had been agreed.⁹⁵ Remarks to this effect can be found in the margins throughout several Dutch apprenticeship ledgers.⁹⁶

V

The apprentices hitherto examined were nonetheless probably not boarding with their masters. This could imply that they were less costly for masters because of the absence of costs of board and keep. It is conceivable that contracts for boarding apprentices needed to be enforced to a greater degree if their productivity was insufficient to cover these additional costs. Since wages received by non-boarding apprentices approximate productivity, they should roughly cover the costs of keep to remove potential issues of enforceability for boarding apprentices. If not, there could still have been an investment to be recouped afterwards, or another subsidy may have been required to cover these additional costs.

As working hours may have been similar, first-year wages from regular and orphan apprentices can be grouped to estimate whether their productivity was sufficient to cover costs of board and keep. Apprenticed orphans may have worked about 60 hours a week.⁹⁷ Data on working hours of regular apprentices are scarce, but according to a selection of notarial contracts they worked anywhere between eight and 12 hours per day.⁹⁸ Amsterdam cooper apprentices may have worked from 7 a.m. to 5 p.m.⁹⁹ Combining all first-year wages gives an average of 6.2 *stuivers*

⁹³ van Meeteren, *Op hoop van akkoord*, pp. 269–70.

⁹⁴ These were masters Sanders and Smaze.

⁹⁵ SAA, Archief gilden, inv. 895, fo. 188.

⁹⁶ Cf. RAL, Archief gilden, inv. 524; SAA, Archief gilden, inv. 255; Gemeentearchief 's-Hertogenbosch, 's-Hertogenbosch, Archieven ambachts- en schuttersgilden, inv. 311.

⁹⁷ RAL, HGW, inv. 34, fo. 14v; SAA, Weeshuis en Oudemannen- en -Vrouwenhuis der Evangelisch-Lutherse Gemeente, inv. 99; McCants, *Civic charity*, pp. 38–9.

⁹⁸ de Jager, 'Meester, leerjongen', pp. 96–108.

⁹⁹ SAA, Archief gilden, inv. 895, fo. 138r.

per week.¹⁰⁰ There are signs that both groups regularly received 'drinking money' which added one-fourth to their earnings.¹⁰¹ Beginning apprentices therefore earned approximately 7.75 *stuivers* a week.

Around 1750, 17 *stuivers* per week were needed to buy 2,200 kcal daily.¹⁰² Consequently, boarding apprentices could not have paid for board and keep solely by providing labour during the first years of their term. By year three, wages were often sufficiently high to buy subsistence.¹⁰³ Several Amsterdam cooper contracts explicitly state that boarding apprentices did not need to pay extra from the third year of their term, suggesting that by that time their labour alone was indeed sufficient to cover board and keep.¹⁰⁴ However, before year three an additional 10 *stuivers* a week was approximately required to pay for boarding. If masters were subsidizing this, they would thus have needed to advance about 25 *guilders* a year, but, as has been demonstrated, masters had little incentive to advance these costs.

The remaining gap between productivity and costs of board and keep was therefore most likely paid by another party, such as the apprentice's parents. It is well-known that premiums were common for apprenticeships. Minns and Wallis demonstrated that experienced apprentices in seventeenth-century England paid relatively lower premiums because their labour presumably covered a larger share of the costs of keep.¹⁰⁵ As also suggested by cooper contracts, premiums could well have been used to bridge the temporary gap between productivity and training costs in Amsterdam. Premiums for cooping apprenticeships in Amsterdam ranged between 25 to 100 *guilders*, which was very likely sufficient to compensate masters for costs of board and keep not yet covered by apprentices' labour.

Additional evidence denotes that extra training investments were indeed possibly paid by apprentices or their guardians, instead of being advanced by masters. Apprentices were relatively vulnerable because premiums were often paid up front.¹⁰⁶ It is therefore not surprising that in London most cases of arbitrage were initiated because apprentices wanted their premium refunded when they were fired, and not because masters wanted to reclaim training costs.¹⁰⁷ This resembles the arbitration cases of the Leiden regents. Moreover, also in Leiden, masters rarely complained about apprentices quitting, already indicating that they never stood to lose much. Furthermore, whenever cooper apprentices from Amsterdam paid a premium they did so in two instalments: one half at the beginning and the other half at the end of the first year, or even later.¹⁰⁸ This suggests that not masters but apprentices were anxious about losing their training investment. Conversely, when apprentices continued to live at home their first-year wages were also insufficient to pay for consumption, and parents had to provide the rest. This is not different

¹⁰⁰ There are no significant variations in first-year apprentices' wages apart from the Amsterdam coopers after 1760. These have been excluded.

¹⁰¹ Cf. RAL, HGW, inv. 3865, inv. 34, fo. 62v; SAA, Archief gilden, inv. 895, fo. 156v; Reith, 'Apprentices', p. 189.

¹⁰² de Vries and van der Woude, *First modern economy*, p. 625.

¹⁰³ Cf. Wallis, 'Apprenticeship and training', p. 847.

¹⁰⁴ SAA, Archief gilden, inv. 895, fos. 7r, 24r, 93v, 182v, 185v, 190r.

¹⁰⁵ Minns and Wallis, 'Price of human capital', p. 347. Premiums were also affected by other factors, such as accessibility of the craft and status of the master. This is beyond the scope of this article.

¹⁰⁶ Wallis, 'Apprenticeship and training', p. 850.

¹⁰⁷ Wallis, 'Labor, law, and training'.

¹⁰⁸ SAA, Archief gilden, inv. 895.

from the Dutch orphanages, who were also possibly subsidizing training during the beginning of the term.¹⁰⁹ Although the premiums required for a common craft such as cooping were probably not extraordinary—25 *guilders* was below the monthly wage of a skilled artisan—this way of funding board and keep could explain why apprenticeships were often out of reach for the really poor.¹¹⁰

VI

As apprentices' labour and possibly premiums removed issues of unenforceability, masters and guilds were not preoccupied with contract enforcement. What, then, was the involvement of Dutch craft guilds in apprenticeship training? Some involvement may have been positive, such as certifying skills. However, it has also been argued that guilds were mainly concerned with restricting access to crafts by setting arbitrarily long terms and by limiting the numbers of apprentices.¹¹¹ This can be examined for guilds from Leiden and Utrecht. The first critique does not hold. All surviving guild by-laws set required apprenticeship terms below four years, which was lower than most observed apprenticeship terms.¹¹² Actual terms were probably longer to enable mastery of the craft rather than discouraging apprentices.¹¹³

Many consulted by-laws did, however, limit the number of apprentices per master. The Leiden tailors' guild prescribed that masters could only train one apprentice at a time.¹¹⁴ In most other cases this limit was also set at one or two apprentices.¹¹⁵ For instance, the Utrecht carpenters' guild limited the number of apprentices to one at a time.¹¹⁶ Orphanages and parents would have been severely restrained in apprenticing adolescents in guild-controlled crafts if these rules were upheld. Indeed, hardly any master apprenticed two orphans at the same time where these rules were present. Although chair maker Graaf, wicker furniture maker Maartense, cooper Taarling, and carpenter Munnick apprenticed multiple orphans, these were never trained simultaneously. Only one Utrecht carpenter breached these rules. The other approximately 20 Utrecht carpenters never apprenticed more than one orphan simultaneously.

The Leiden textile industry was not controlled by guilds but by *neringen*. These did not limit the number of simultaneously allowed apprentices.¹¹⁷ In contrast to the crafts, these masters therefore could, and did, apprentice multiple orphans at once. This probably explains why many Leiden orphans started their apprenticeship careers here, moving to the crafts only when an apprenticeship there opened up. Thread winder Malesteijn at least three times apprenticed four orphans

¹⁰⁹ Wiel, *Dit kind hiet Willem*, p. 51. Financial records are not detailed enough to link wages to the costs of keep for individual orphans.

¹¹⁰ Ben-Amos, 'Failure to become freemen', pp. 159–60.

¹¹¹ De Munck, *Technologies*, pp. 80–4; Ogilvie, 'Guilds, efficiency, and social capital', pp. 307–10; Wallis, 'Apprenticeship and training', p. 852.

¹¹² RAL, Archief gilden, inv. 5, inv. 63; Slokker, *Ruggengraat*, p. 76.

¹¹³ Davids, 'Apprenticeship and guild control', p. 68.

¹¹⁴ RAL, Archief gilden, inv. 5.

¹¹⁵ Ibid.; Slokker, *Ruggengraat*, p. 76.

¹¹⁶ HUA, Archieven stadsbestuur, inv. 79, fo. 15r.

¹¹⁷ Soly, 'Political economy', pp. 64–5; Posthumus, *Geschiedenis*, vol. 3, pp. 355, 613, 701. Only one of six *neringen* regulations set a (relatively high) maximum of four apprentices; idem, *Bronnen*, vol. 5, pp. 301–2.



Figure 6. *Male population of the Leiden orphanage*

Notes: The number of total orphaned boys during 1830–57 is estimated assuming a male population of 45%, based on Wiel, *Dit kint hiet Willem*, pp. 117–19. The vertical dotted line marks the 1763 policy break away from apprenticeships in textiles. Sources: RAL, HGW, inv. nos. 2545, 2546, 2547, 3419, 3876.

in one year. Thread winder Beijer apprenticed no less than 18 orphans in eight years. Textile leash maker Vermeulen apprenticed at least five orphans in 1754. In 1753, one-third of all Leiden masters in textiles apprenticed more than one orphan simultaneously, compared to only one out of 47 masters in the crafts.¹¹⁸ Moreover, the decision in 1763 not to apprentice orphans in textiles any more was only conceivable when the orphanage population had dropped significantly, as can be seen in figure 6. The small peak of apprenticed boys in 1764 is explained by Malesteijn, a master in thread winding. These apprenticeships were added later to the ledger, because it still proved impossible to apprentice these orphans in the crafts directly following the 1763 decision.¹¹⁹

After the guilds were abolished, a much larger share of orphaned boys were apprenticed in the crafts directly. During 1829–46 the orphanage population even increased, but now only 9 per cent of orphans started in textiles. In comparison, between 1754 and 1762 about 70 per cent of boys had started here (table 1). Guild by-laws may thus previously have restricted access to craft apprenticeships. A much larger share of orphans apprenticed in textiles actually finished their apprenticeship in textiles in the nineteenth century, indicating that textiles was no longer considered an exit option by apprentices starting here.

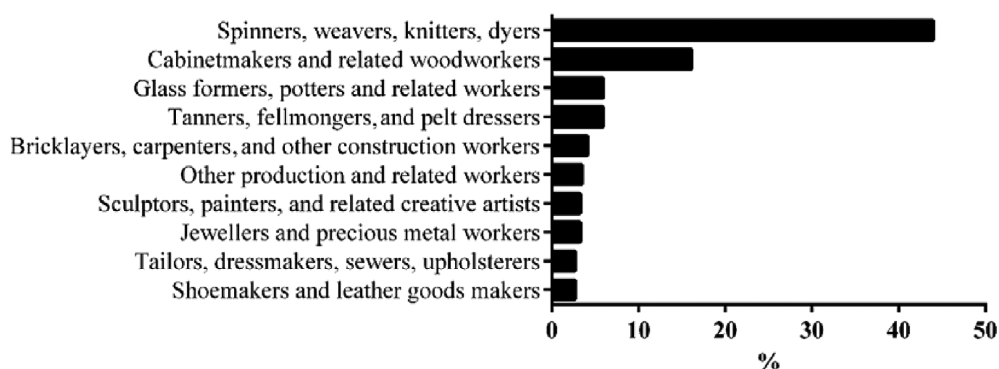
Access to craft apprenticeships may have improved after the guilds precisely because local masters were no longer disallowed to take on multiple apprentices. Cooper Sliggers, paperer Labree, silversmith Du Croix, goldsmith Gonzaal, broom maker Platté, tinsmith Bosman, and glassmaker Zirkzee all trained more than one orphan simultaneously between 1829 and 1846. The disappearance of guild regulation may also have increased the number of independent masters in Leiden. During 1754–82 the total number of craftsmen hiring orphans did not exceed 90, but between 1829 and 1846 around 220 individual craftsmen appeared before the Leiden regents.

Comparison of the distribution of apprenticeship contracts further suggests that access to apprenticeships may have improved after the guilds. Figure 7 shows

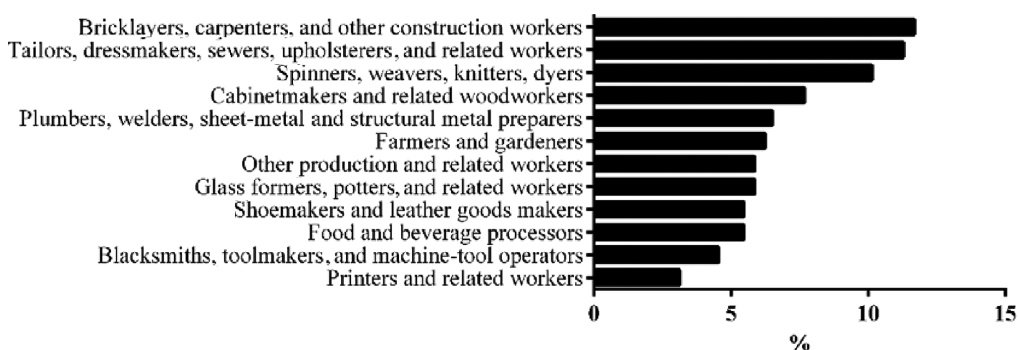
¹¹⁸ RAL, HGW, inv. 2546, fos. 6r–18v.

¹¹⁹ RAL, HGW, inv. 2546, fo. 118r.

A. Leiden, 1754–82.



B. Leiden, 1829–46.



C. Utrecht

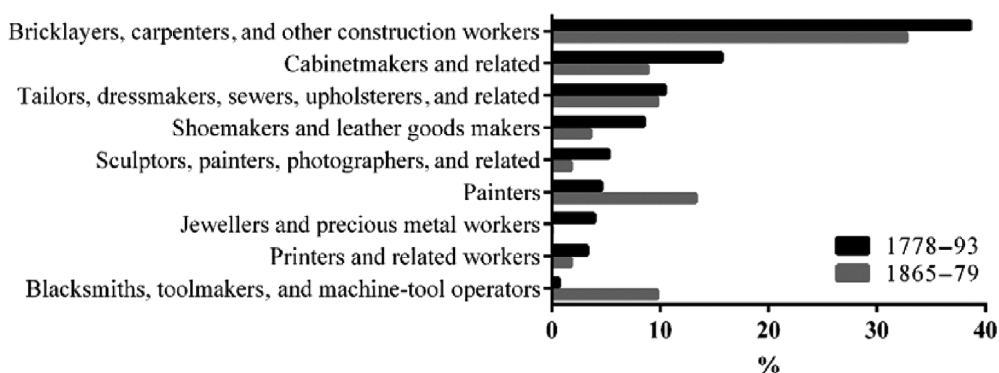


Figure 7. *Distribution of apprenticeship contracts of orphans before and after the abolition of the guilds*

Sources: RAL, HGW, inv. 3855, inv. 3862; HUA, Archief Gereformeerd Burgerweeshuis, inv. 769-2, inv. 772-1.

all served apprenticeship contracts per craft sector for orphans from Leiden and Utrecht, before and after the abolition of Dutch guilds. During the period 1754–82 the bulk of all Leiden orphans were apprenticed in textiles. Figure 7, panel B, demonstrates that access to apprenticeships in previously guild-controlled crafts greatly increased after the guilds were abolished, as the distribution of apprentices over different crafts became much more diverse.¹²⁰ The dominant sector of tailoring accounted for only 12 per cent of all contracts. Instead of being predominantly apprenticed in textiles or woodworking, the diversity of crafts increased dramatically, with several orphans even being apprenticed to apothecaries and instrument makers.

Changes may have been more modest in Utrecht (figure 7, panel C), where apprenticeships in construction were dominant during both periods. Nevertheless, the distribution of apprenticeships over crafts changed significantly here as well.¹²¹ Here too apprentices were spread over more occupational groups after the guilds. Under the guilds 153 contracts were spread over 17 sectors, while after the guilds fewer contracts (118) were spread over 18 sectors. It is not surprising that machine-operating became more popular around the period of industrialization. It is worth noting that abolition of the guilds did not affect access to apprenticeship training negatively in Leiden. During both periods the share of apprenticed boys was consistently around 50 per cent (figure 6).¹²² Based on the wages brought in by apprenticed orphans in Utrecht, here too the disappearance of the guilds did not cause apprenticeship training to decline.¹²³

It could be argued that the large Leiden textile industry drives the difference in the distribution of apprenticeships. This can be evaluated using the 1763 policy change, since this significantly reduced the number of orphans apprenticed in textiles. If guild abolition did not affect training, the distribution of contracts should be comparable between 1763–82 and 1829–46. Yet this distribution was significantly different between these periods.¹²⁴ Moreover, the total share of the Leiden workforce employed in the crafts even declined during the nineteenth century, and it was only after 1850 that the Leiden economy became more diversified.¹²⁵ A law prohibiting child labour was only introduced in 1874, and before that children in Leiden continued to work in large numbers, not least in textiles.¹²⁶ Hence, if local conditions were the main force driving these changes in apprenticeship distribution, we would expect either a lower share of orphans placed in craft apprenticeships, or a less diverse distribution.¹²⁷ These changes can also not be explained by changing terms or different ages of apprenticed orphans. During both centuries Leiden orphans in textiles and the crafts started at around the same age. Apprenticeship terms did not change much between the two periods in Leiden and in Utrecht, when mobility relating to textiles is excluded. The

¹²⁰ A Chi-squared test has been performed to test if the distribution of apprenticeships changed significantly; χ^2 (18, $n = 1,064$) = 330.59, $p < 0.05$.

¹²¹ χ^2 (9, $n = 231$) = 30.32, $p < 0.05$.

¹²² The somewhat lower share of apprenticed orphans in the 1850s was caused by an outbreak of cholera; Wiel, *Dit kint hiet Willem*, p. 125.

¹²³ HUA, Archief Burgerweeshuis, inv. 2(e).

¹²⁴ χ^2 (7, $n = 510$) = 68.72, $p < 0.05$.

¹²⁵ Pot, *Arm Leiden*, p. 57.

¹²⁶ Smit, 'Leidse kinderen', pp. 74–7.

¹²⁷ Pot, *Arm Leiden*, p. 64.

Table 3. *Estimate of Utrecht cooper apprenticeships breaching guild regulations*

<i>Period</i>	<i>New apprenticeships</i>	<i>Possible illegal apprenticeships</i>	<i>%</i>
1588–99	108	3	2.78
1600–9	90	7	7.78
1610–19	135	2	1.48
1620–9	127	3	2.36
1630–9	155	13	8.39
1640–9	147	15	10.20
1650–62	202	12	5.94
1588–1662	964	55	5.71

Source: HUA, Archief Stadsbestuur, inv. 124.

number of masters during the apprenticeship career was furthermore similar in both cities between the two periods.

Census data are not detailed enough to evaluate regular apprenticeships after the guilds in the same manner.¹²⁸ Nevertheless, apprenticeship records suggest that regular apprentices' access to training was limited during the guilds as well. The Utrecht gold- and silversmiths' guild allowed two apprentices simultaneously for a term of three years.¹²⁹ Masters adhered to these rules. Not a single one of the 41 masters apprenticed more than two boys at the same time between 1730 and 1750.¹³⁰ It has already been demonstrated that no single Leiden glassmaker apprenticed more than one boy simultaneously between 1744 and 1790, which was in line with their regulations as well. In 1766 the Leiden cloth shearers, one of the few textile crafts organized in a guild, even complained that limits on the number of apprentices prevented their trade from expanding.¹³¹

For the Utrecht coopers' guild it is possible to examine how apprentices were distributed between 1598 and 1662. A combination of by-laws ensured that masters were only allowed to hire one new apprentice every year.¹³² By linking all apprentices to their masters table 3 estimates whether these rules were breached. Over a period of 75 years only a minor 6 per cent of apprenticeships were possibly breaking guild regulations. Even these numbers are an overestimation because it is possible that a previous apprentice had quit, leaving room to hire another apprentice during the same year. This happened regularly in the Amsterdam butchers' guild mentioned earlier.¹³³ Accordingly, apprentices could have been severely restrained in gaining access to apprenticeships if masters from other guilds were also not free to take on as many apprentices as they wanted.

A final way to evaluate changes in apprenticeships after the guilds is to look at wages again. If guilds were indeed rent-seeking, they may have been able to bargain apprentices' wages down. Wages should then have increased during the nineteenth century. First-year wages in Leiden were, however, not significantly different

¹²⁸ Smit, 'Leidse fabriekskinderen', p. 80.

¹²⁹ HUA, Archieven stadsbestuur, inv. 126.

¹³⁰ HUA, Archieven stadsbestuur, inv. 131-1.

¹³¹ Posthumus, *Bronnen*, vol. 6, p. 528.

¹³² HUA, Archieven stadsbestuur, inv. 123.

¹³³ SAA, Archief gilden, inv. 1470.

between the eighteenth and nineteenth century.¹³⁴ Perhaps this stability implies that training quality did not decline after the guilds. Wages of apprenticed orphans in Utrecht were higher during 1865–79, but this has probably to do with the general increase in Dutch wages, caused by industrialization, which had set in by then.¹³⁵ Wages alone may nevertheless be insufficient to draw any firm conclusions about the rent-seeking nature of guilds. Even in the face of economic change, pre-industrial nominal wages are known to have been remarkably stable, and Dutch wages were no exception.¹³⁶ These only really increased from the end of the nineteenth century, and were stable between c. 1650 and 1870.¹³⁷ In Leiden the wages of artisans did not change at all between 1750 and 1850.¹³⁸ Moreover, it is also conceivable that population growth before Dutch industrialization pushed wages down.¹³⁹ Between 1795 and 1850 the Dutch population rose by approximately one million.¹⁴⁰ A larger number of adolescents vying for apprenticeships could have offset any rise in apprentices' wages caused by the abolition of the guilds.¹⁴¹

Dutch apprenticeship in any case shows no signs of deterioration after the guilds disappeared. It only appears to have declined when demand for unskilled workers significantly increased around the 1870s.¹⁴² Until then, Dutch on-the-job training probably continued to function well. For instance, around 1850 the Utrecht Chamber of Commerce noted that turnover in foundries had improved because of their skilled labour force.¹⁴³ Because contract enforcement was not needed for apprenticeship to function, it is perhaps not remarkable that abolishing the Dutch guilds did not affect apprenticeship in any way other than possibly opening access to training.

VII

Apprenticeship records of orphans from the Dutch cities of Leiden and Utrecht during the eighteenth and nineteenth century allow us to examine the functioning of pre-industrial apprenticeship training. High mobility of apprentices, diverse terms, and considerable levels of contract breach demonstrate that contracts were not enforced. Yet apprenticeship continued to function well. Gradually increasing wages observed for large groups of non-boarding apprentices demonstrate that apprentices were making a contribution to the workshop from the start, which very likely exceeded any training investments. Through a combination of menial tasks and learning by doing, apprentices provided increasingly valuable labour, while masters invested very little in direct training. Although this may have prolonged the training period, it resolved issues of unenforceability and provided an incentive for masters to take on apprentices. Premiums were possibly used to compensate

¹³⁴ A Student's t-test has been performed to test if the two series are significantly different from each other; $t(106) = 1.768$, $p > 0.05$.

¹³⁵ Vermaas, 'Real industrial wages', pp. 139–45; 't Hart, *Leven in Utrecht*, pp. 237–9.

¹³⁶ Munro, 'Wage-stickiness'.

¹³⁷ de Vries and van der Woude, *First modern economy*, p. 614; Noordegraaf, *Daglonen*, p. 80.

¹³⁸ Pot, *Arm Leiden*, pp. 303–7.

¹³⁹ Mokyr, *Industrialization in the Low Countries*, pp. 189–95. Cf. Lindert, 'English population, wages, and prices'.

¹⁴⁰ Bakker, Noordam, and Rietveld-van Wingerden, *Vijf eeuwen opvoeden*, pp. 206–7.

¹⁴¹ Cf. Pot, *Arm Leiden*, pp. 54–5.

¹⁴² Schalk, *Splitting the bill*, ch. 3.

¹⁴³ 't Hart, *Leven in Utrecht*, p. 253.

masters for additional costs of board and keep not yet covered by apprentices' productivity, further reducing the need for contract enforcement. Thus, early modern apprenticeship training was not a two-stage model where masters were advancing substantial investments in training, as suggested by Epstein, but was more like a standard labour market for young workers. Under these settings it is not surprising that there is no evidence of guilds or masters complaining about the lack of contract enforcement or about high levels of attrition.

Although Dutch guilds were not needed for apprenticeship to function, they may have reduced access to training through by-laws limiting the number of apprentices per master. In both Leiden and Utrecht in the eighteenth century, orphans and regular apprentices seem to have experienced reduced access to training. Many Leiden orphans were apprenticed in textiles, where no guilds existed, to perform relatively low-skilled work until an apprenticeship in a guild-controlled craft opened up. This limiting of access to apprenticeships may have been part of a wider policy of guilds aimed at excluding outsiders and upholding monopolies, although the extent to which they were able to do so possibly varied per period and city.¹⁴⁴

Because contracts did not need to be enforced, Dutch apprenticeship was not significantly affected by the abolition of the guilds. After the Dutch guilds, Leiden orphans even had access to a broader range of apprenticeships in the crafts, and no longer needed to resort to textile apprenticeships. At the same time the number of masters may have increased. It is conceivable that better access to training fundamentally changed the Leiden craft sector, for instance, by increasing competition and promoting specialization. Earlier limitations on the number of apprentices could have obstructed an increasing division of labour. Perhaps this explains why at times masters resorted to subcontracting with other masters.¹⁴⁵

More empirical research is needed to see whether apprenticeship functioned in the same manner in different regions and periods, and whether other guilds acted similarly to those in Leiden and Utrecht.¹⁴⁶ Nevertheless, the data presented for regular Dutch apprentices show that their mobility, terms, and earnings were very similar to orphan apprenticeships. Apprenticeship training in early modern England and Antwerp resembles the arrangements of these orphan apprenticeships as well. The functioning of early modern apprenticeship training in the Netherlands could therefore well have been 'generally applicable across Europe'.¹⁴⁷

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¹⁴⁴ Prak, Crowston, De Munck, Kissane, Minns, Schalk, and Wallis, 'Access to the trade'; Panhuysen, 'Amsterdamse en Haarlemse kleermakersgilden'.

¹⁴⁵ Farr, 'On the shop floor', pp. 39–42.

¹⁴⁶ Nusteling, *Wélvaart*, pp. 110, 150–2; De Munck, *Technologies*, p. 148; Dambruyne, *Corporatieve middengroepen*, ch. 2.

¹⁴⁷ Wallis, 'Apprenticeship and training', p. 854.

Footnote references

- Bakker, N., Noordam, J., and Rietveld-van Wingerden, M., *Vijf eeuwen opvoeden in Nederland: idee en praktijk: 1500–2000* (Assen, 2006).
- Becker, G. S., *Human capital: a theoretical and empirical analysis, with special reference to education* (New York, 2nd edn. 1975).
- Ben-Amos, I. K., 'Failure to become freemen: urban apprentices in early modern England', *Social History*, 16 (1991), pp. 155–72.
- Blondé, B. and Hanus, J., 'Beyond building craftsmen. Economic growth and living standards in the sixteenth-century Low Countries: the case of 's-Hertogenbosch (1500–1560)', *European Review of Economic History*, 14 (2010), pp. 179–208.
- Boot, H. M., 'How skilled were Lancashire cotton factory workers in 1833?', *Economic History Review*, XLVIII (1995), pp. 283–303.
- Davids, K., 'Apprenticeship and guild control in The Netherlands, c. 1450–1800', in B. De Munck, S. L. Kaplan, and H. Soly, eds., *Learning on the shop floor: historical perspectives on apprenticeship* (New York, 2007), pp. 65–84.
- Dambruyne, J., *Corporatieve middengroepen: aspiraties, relaties en transformaties in de 16de-eeuwse Gentse ambachtswereld* (Ghent, 2002).
- Elbaum, B., 'Why apprenticeship persisted in Britain but not in the United States', *Journal of Economic History*, XLIX (1989), pp. 337–49.
- Epstein, S. R., 'Craft guilds, apprenticeship, and technological change in preindustrial Europe', *Journal of Economic History*, 58 (1998), pp. 684–713.
- Epstein, S. R., 'Craft guilds in the pre-modern economy: a discussion', *Economic History Review* 61 (2008), pp. 155–74.
- Farr, J. R., 'On the shop floor: guilds, artisans, and the European market economy, 1350–1750', *Journal of Early Modern History*, 1 (1997), pp. 24–54.
- Galor, O. and Moav, O., 'From physical to human capital accumulation: inequality and the process of development', *Review of Economic Studies*, 71 (2004), pp. 1001–26.
- Groenveld, S., Dekker, J. J. H., Willemse, T. R. M., and Dane, J., *Wezen en boefjes: zes eeuwen zorg in wees- en kinderhuizen* (Hilversum, 1997).
- Hamilton, G., 'The decline of apprenticeship in North America: evidence from Montreal', *Journal of Economic History*, 60 (2000), pp. 627–64.
- Humphries, J., 'English apprenticeship: a neglected factor in the first industrial revolution', in P. A. David and M. Thomas, eds., *The economic future in historical perspective* (Oxford, 2003), pp. 73–102.
- Humphries, J., *Childhood and child labour in the British industrial revolution* (Cambridge, 2011).
- Humphries, J., 'Rent seeking or skill creating? Apprenticeship in early industrial Britain', in P. Gauci, ed., *Regulating the British economy, 1660–1850* (Farnham, 2011), pp. 235–58.
- de Jager, R., 'Meester, leerjongen, leertijd. Een analyse van zeventiende-eeuwse Noord-Nederlandse leerlingcontracten van kunstschilders, goud- en zilversmeden', *Oud-Holland*, 104 (1990), pp. 69–110.
- de Kerf, R., 'De circulatie van technische kennis in het vroegmoderne Antwerpse ambachtswezen, 1500–1800 (casus kuipers en edelsmeden)' (unpub. Ph.D. thesis, Univ. of Antwerp, 2013).
- Klemp, M., Minns, C., Wallis, P., and Weisdorf, J., 'Picking winners? The effect of birth order and migration on parental human capital investments in pre-modern England', *European Review of Economic History*, 17 (2013), pp. 210–32.
- Leeuwen, M. H. D., Maas, I., and Miles, A., *HISCO: Historical International Standard Classification of Occupations* (Leuven, 2002).
- Lindert, P. H., 'English population, wages, and prices: 1541–1913', *Journal of Interdisciplinary History*, XV (1985), pp. 609–34.
- Lucassen, J., de Moor, T., and van Zanden, J. L., 'The return of the guilds: towards a global history of the guilds in pre-industrial times', *International Review of Social History*, 53, S16 (2008), pp. 5–18.
- McCants, A. E. C., *Civic charity in a golden age: orphan care in early modern Amsterdam* (Urbana, Ill., 1997).
- McCants, A. E. C., 'Poor consumers as global consumers: the diffusion of tea and coffee drinking in the eighteenth century', *Economic History Review*, 61, S1 (2008), pp. 172–200.
- van Meeteren, A., *Op hoop van akkoord: instrumenteel forumgebruik bij geschilbeslechting in Leiden in de zeventiende eeuw* (Hilversum, 2006).
- Minns, C. and Wallis P., 'Rules and reality: quantifying the practice of apprenticeship in early modern England', *Economic History Review*, 65 (2012), pp. 556–79.
- Minns, C. and Wallis, P., 'The price of human capital in a pre-industrial economy: premiums and apprenticeship contracts in 18th century England', *Explorations in Economic History*, 50 (2013), pp. 335–50.
- Mokyr, J., *Industrialization in the Low Countries, 1795–1850* (New Haven, Conn., 1976).
- Mokyr, J., *The gifts of Athena: historical origins of the knowledge economy* (Princeton, NJ, 2002).
- Mokyr, J., *The enlightened economy: Britain and the industrial revolution, 1700–1850* (New Haven, Conn., 2009).
- De Munck, B., 'Construction and reproduction. The training and skills of Antwerp cabinetmakers in the sixteenth and seventeenth centuries', in B. De Munck, S. L. Kaplan, and H. Soly, eds., *Learning on the shop floor: historical perspectives on apprenticeship* (New York, 2007), pp. 85–110.

- De Munck, B., *Technologies of learning: apprenticeship in Antwerp guilds from the 15th century to the end of the Ancien Régime* (Turnhout, 2007).
- De Munck, B. and Soly, H., '“Learning on the shop floor” in historical perspective', in B. De Munck, S. L. Kaplan, and H. Soly, eds., *Learning on the shop floor: historical perspectives on apprenticeship* (New York, 2007), pp. 3–34.
- Munro, J. H., 'Wage-stickiness, monetary changes, and real incomes in late-medieval England and the Low Countries, 1300–1500: did money matter?', *Research in Economic History*, 21 (2003), pp. 185–297.
- Murphy, K. M. and Welch, F., 'Empirical age-earnings profiles', *Journal of Labor Economics*, 8 (1990), pp. 202–29.
- van Nederveen Meerkerk, E., *De draad in eigen handen: vrouwen en loonarbeid in de Nederlandse textielnijverheid, 1581–1810* (Amsterdam, 2007).
- van Nederveen Meerkerk, E., 'Market wage or discrimination? The remuneration of male and female wool spinners in the seventeenth-century Dutch Republic', *Economic History Review*, 63 (2010), pp. 165–86.
- van Nederveen Meerkerk, E. and Schmidt, A., 'Tussen arbeid en beroep: jongens en meisjes in de stedelijke nijverheid, ca. 1600–1800', *Tijdschrift voor Sociale en Economische Geschiedenis*, 3 (2006), pp. 24–50.
- van Nederveen Meerkerk, E. and Schmidt, A., 'Between wage labor and vocation: child labor in Dutch urban industry, 1600–1800', *Journal of Social History*, 41 (2008), pp. 717–36.
- Noordegraaf, L., *Daglonen in Alkmaar 1500–1850* (Haarlem, 1980).
- Nusteling, H., *Welvaart en werkgelegenheid in Amsterdam, 1540–1860: een relaas over demografie, economie en sociale politiek van een wereldstad* (Amsterdam, 1985).
- Ogilvie, S., 'Guilds, efficiency, and social capital: evidence from German proto-industry', *Economic History Review*, LVII (2004), pp. 286–333.
- Ogilvie, S., 'Can we rehabilitate the guilds?: a sceptical reappraisal', Cambridge working paper in economics, 0745 (2007), <https://doi.org/10.17863/CAM.5174> (accessed on 22 Nov. 2016).
- Ogilvie, S., 'Rehabilitating the guilds: a reply', *Economic History Review*, 61 (2008), pp. 175–82.
- Panhuysen, B., 'De Amsterdamse en Haarlemse kleermakersgilden en hun concurrenten. De in- en uitsluiting van mededingers op de lokale afzetmarkt in de 17de en 18de eeuw', in C. Lis and H. Soly, eds., *Werelden van verschil: ambachtsgilden in de Lage Landen* (Brussels, 1997), pp. 127–50.
- Pfister, U., 'Craft guilds and proto-industrialization in Europe, 16th to 18th centuries', in S. R. Epstein, H. G. Haupt, C. Poni, and H. Soly, eds., *Guilds, economy and society* (Seville, 1998), pp. 11–24.
- Posthumus, N. W., *Geschiedenis van de Leidse lakenindustrie*, 3 vols. (The Hague, 1908–39).
- Posthumus, N. W., *Bronnen tot de geschiedenis van de Leidsche textielnijverheid 1333–1795*, 6 vols. (The Hague, 1910–22).
- Pot, G. P. M., *Arm Leiden: levensstandaard, bedeling en bedeeden, 1750–1854* (Hilversum, 1994).
- Prak, M., Crowston, C., De Munck, B., Kissane, C., Minns, C., Schalk, R., and Wallis, P., 'Access to the trade: citizens, craft guilds and social and geographical mobility in early modern Europe', bEUcitizen working paper 3.3 (2016).
- Prak, M., Lis, C., Lucassen, J., and Soly, H., eds., *Craft guilds in the early modern Low Countries: work, power, and representation* (Aldershot, 2006).
- Reith, R., 'Apprentices in the German and Austrian crafts in early modern times: apprentices as wage earners?', in B. De Munck, S. L. Kaplan, and H. Soly, eds., *Learning on the shop floor: historical perspectives on apprenticeship* (New York, 2007), pp. 179–202.
- Schalk, R., *Splitting the bill: matching schooling to Dutch labour markets, 1750–1920* (Amsterdam, 2015).
- Slokker, N. H., *Ruggengraat van de stedelijke samenleving: de rol van de gilden in de stad Utrecht, 1528–1818* (Amsterdam, 2010).
- Smit, C., 'Leidse kinderen tussen fabriek en school, 1840–1914: deel II: werk, opvoeding en huishouden', *Leidschrift* 20 (2002), pp. 73–91.
- Smit, C., 'De Leidse fabriekskinderen: kinderarbeid, industrialisatie en samenleving in een Hollandse stad, 1800–1914' (unpub. Ph.D. thesis, Utrecht Univ., 2014).
- Smits, W. and Stromback, T., *The economics of the apprenticeship system* (Cheltenham, 2001).
- Soly, H., 'The political economy of European craft guilds: power relations and economic strategies of merchants and master artisans in the medieval and early modern textile industries', *International Review of Social History*, 53, S16 (2008), pp. 45–71.
- Sonenscher, M., *Work and wages: natural law, politics and the eighteenth-century French trades* (Cambridge, 1989).
- 't Hart, P. D., *Leven in Utrecht 1850–1914: groei naar een moderne stad* (Hilversum, 2005).
- Tump, J., 'Ambachtelijk geschoold: Haarlemse en Rotterdamse ambachtsslieden en de circulatie van technische kennis, ca. 1400–1720' (unpub. Ph.D. thesis, Vrije Universiteit Amsterdam, 2012).
- Vermaas, A., 'Real industrial wages in the Netherlands, 1850–1913', in: P. Scholliers and V. N. Zamagni, eds., *Labour's reward: real wages and economic change in 19th- and 20th-century Europe* (Aldershot, 1995), pp. 138–50.
- van der Vlis, I., *Weeshuizen in Nederland: de wisselende gestalten van een weldadig instituut* (Zutphen, 2002).
- van der Vlis, I., *Van wezen tot zijn: vier eeuwen zorg voor jongeren* (Zutphen, 2005).
- de Vries, J. and van der Woude, A., *The first modern economy: success, failure, and perseverance of the Dutch economy, 1500–1815* (Cambridge, 1997).

- Wallis, P., 'Apprenticeship and training in premodern England', *Journal of Economic History*, 68 (2008), pp. 832–61.
- Wallis, P., 'Labor, law, and training in early modern London: apprenticeships and the City's institutions', *Journal of British Studies*, 51 (2012), pp. 791–819.
- Wiel, K., *Dit kint hiet Willem: de Heilige Geest in Leiden, 700 jaar vondelingen, wezen en jeugdzorg* (Leiden, 2010).
- Wiskerke, C., *De afschaffing der gilden in Nederland* (Amsterdam, 1938).
- van Zanden, J. L., 'The skill premium and the "Great Divergence"', *European Review of Economic History*, 13 (2009), pp. 121–53.