SPLITTING THE BILL

Ruben Schalk

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Matching schooling to Dutch labour markets, 1750-1920

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Matching schooling to Dutch labour markets, 1750-1920

De rekening delen
Scholing aanpassen aan Nederlandse arbeidsmarkten, 1750-1920

(met een samenvatting in het Nederlands)

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Ruben Schalk

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Promotoren: Prof.dr. O.C. Gelderblom
Prof.dr. L.J. Dorsman

Manuscript committee: Prof.dr. M.G.J. Duijvendak
Prof.dr. J.P.B. Jonker
Prof.dr. W.W. Mijnhardt
Prof.dr. P.H. Wallis
Prof.dr. J.L. van Zanden

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Chapter 1. Introduction

The period of industrialisation in Western countries between roughly the eighteenth and the early twentieth century arguably spurred the most profound economic change of all times. Compared to the preceding centuries annual economic growth was not only greater, it also became more continuous, putting in place the process of sustained economic growth that has continued by and large to this day.[1] In countries that led the Industrial Revolution, most notably the United Kingdom, it appears that mechanization and an increasing division of labour caused a deskilling of a large share of the workforce.[2] In countries that caught up, however, demand for skilled workers increased during the nineteenth century and the beginning of the twentieth century.[3] Skills were for instance needed to operate and service new methods of mechanized production, to supervise and manage the growing workforce in industry, and also to handle the accounts of the growing number of firms trading internationally. Consequently, without sufficient skilled workers it would have been difficult to continue the process of industrialisation.[4] The question how exactly these different types of workers were educated is therefore central to our understanding of industrial catch-up. Yet we know surprisingly little on the institutional setting conducive to the training and education of skilled workers during industrial catch-up in Europe.[5] This thesis examines the process of educational adaptation for post-elementary schooling, and its outcomes, focussing on The Netherlands between 1750 and 1920.

1 Galor and Weil, 'From Malthusian stagnation to modern growth'; Van Zanden and Van Leeuwen, 'Persistent but not consistent'; Broadberry et al., *British economic growth.*
2 Mitch, 'The role of education and skill'; Sanderson, 'Literacy and social mobility'.
3 Becker, Hornung, and Woessmann, 'Education and catch-up'; Goldin and Katz, 'The origins of technology-skill complementarity'; Schulz, Maas, and Van Leeuwen, 'Occupational career attainment during modernization'.
4 Goldin and Katz, The race between education and technology.
5 Schulz, Maas, and Van Leeuwen, 'Employer's choice', p. 50; Becker, Hornung, and Woessmann, 'Education and catch-up', p. 93. For the United States see Goldin, 'The human-capital century'.

On a more general level it is often argued that countries were able to catch-up to the industrialisation process through institutional reforms enacted by central governments. In Prussia, for example, the central government removed restrictions on trade and labour mobility and reformed the legal system, thereby ensuring that private parties could trade and produce in a liberal marketplace with secure property rights.[1] Van Zanden and Van Riel have argued that a comparable process of liberalisation explains the process of industrialisation in the nineteenth-century Netherlands. Through the removal of former particularistic structures, such as local taxes, tariffs and diverse jurisdiction, and by liberating national and international trade, they demonstrated that the central government ensured that The Netherlands was firmly put on the path of modern economic growth from the middle of the nineteenth century onwards.[2]

It is, however, not apparent that central governments also ensured the training and education of skilled workers during this period of industrial catch-up. On the topic of education, local and central governments, parents and their children, but also employers and workers were involved in a continuous bargaining process to try to maximize their gains and minimize costs.[3] Did central governments alone ensure that enough skilled workers were educated, or were skills also provided by locally funded schools, or perhaps even by employers? For instance, Van Zanden has suggested that craft guilds, which were profoundly urban institutions, may have ensured that human capital was already provided relatively efficiently in the preindustrial period in many Western countries.[4] It is not a given that central governments took over this hitherto local provision of skills during the nineteenth century. There is a large literature arguing that educational expansion was most successful when initiated locally.[5] Furthermore, also employers may have paid, or advanced, training costs through on-the-job training or apprenticeships.[6] Understanding how skilled workers were provided thus requires an examination into the institutional setting of formal schooling, as well as an understanding of the role played by on-the-job training.

Parliamentary debates of The Netherlands demonstrate that matching supply and demand for skilled workers has always required a constant tweaking

1 For this literature see Becker, Hornung, and Woessmann, 'Education and catch-up', p. 97-8.
2 Van Zanden and Van Riel, The strictures of inheritance.
3 Cf. Thelen, How institutions evolve.
4 Van Zanden, 'The skill premium', p. 147.
5 Lindert, Growing public. See also below.
6 Owen, 'An economic perspective on career formation'.

and changing of educational institutions. In 2014 the Dutch Ministry of Education, Culture and Science proclaimed that intensive relations with employers are required to ensure that schooling connects with labour market demand.[1] But providing the right type of education was a concern already much earlier. In 1901 the progressive liberal politician Dirk Bos lamented that 'nowhere in The Netherlands can we find a post-elementary education that teaches adolescents the skills they need when they begin to work at retailers or offices. This education can be provided by firms or municipalities, but also the state should and must act'.[2] During the middle of the nineteenth century politician Gerrit Abraham de Meester conceded that there was demand for more education for the indigent, the craftsman, and the agrarian.[3]

Matching supply and demand for skills could theoretically have occurred through formal schooling and on-the-job training, but also by reducing the need for skilled workers. Understanding this match consequently requires an examination of the interplay between the state and firms in deciding who provided schooling, and by examining the contribution of each party to the supply of skilled workers.[4] This process was hampered by constraints on both sides. States may provide education not entirely tuned towards labour market demand alone because other motives, such as promoting citizenship or educating a humanistic schooled elite, may have played a role. They may also have been unable to provide schools because of inefficiencies in organisation and funding, causing a mismatch between attendance levels and labour market demand.

Not only in the provision of formal schooling a puzzle had to be solved regarding who should pay how much, also on-the-job training faced comparable challenges. Firms may step in and train workers themselves, but might do so only when they can recoup their training investments, or when they can shift training costs to the employee.[5] In the absence of these mechanisms firms can try to socialise training costs by lobbying for schools, or they can substitute human capital with physical capital. It is, however, unlikely that the latter option will remove skill dependency altogether, as not all skilled work can be replaced easily by mechanization.

Furthermore, to acquire sufficient skilled workers it is imperative that the

1 Tweede Kamer, vergaderjaar 2014–2015, 27 923, no. 189, 5.
2 Handelingen Tweede Kamer 1901-1902, December 12, 1901. Accessed through www.statengeneraaldigitaal.nl.
3 Handelingen Tweede Kamer 1862-1863, March 7, 1863.
4 Thelen, How institutions evolve; Green, 'Education and globalization'; Floud, 'Technical education 1850-1914'.
5 Acemoglu and Pischke, 'Why do firms train?'.

costs of training or schooling did not deter adolescents from acquiring skills.[1] Parents or adolescents would not have invested in training if it did not pay off. And even if it did, they may have been unable to pay for training since the benefits (higher wages) are only captured at some point in the future after training costs have been paid. Thus, state or firms needed to ensure that the level and distribution of training costs or tuition fees did not hamper the provision of skilled workers. This could have been achieved, for instance, by lowering tuition fees, using study grants, or by paying for, or advancing, training costs. For that reason the level and distribution of training costs and tuition fees needs to be considered as well. Was the bill split in such a way that sufficient adolescents could attend school or partake in training?

Changing skill requirements and improving economic conditions during the period 1750-1920 put to the fore the question how states and firms should adapt the supply of skills. Historians have evaluated the provision of institutions for skill formation during this period in different ways. First, the institutional setting needed for skill formation on the work floor before and during industrialisation is contested. This centres around the question if guilds were needed to ensure skill formation on the work floor before vocational schools emerged.[2] Second, with the onset of industrialisation it has been argued that no skills were required because of skill-saving technological change, yet this literature has mostly looked at England only.[3] Countries catching-up may have had quite different skill requirements.[4] Moreover, demand for highly skilled workers did not disappear.[5] As on-the-job training declined because of an increased specialisation and division of labour, the question who ensured skilled workers may even have become more pressing as apprenticeships may have become impractical.[6]

Third, most historians do agree that demand for skills fundamentally changed during the second stage of industrialisation, when technological advances

1 Ploeg, The expansion of secondary and tertiary education, p. 20; Heckman, 'The supply side of the race between demand and supply'.
2 Epstein, 'Craft guilds'; Ogilvie, 'Guilds, efficiency, and social capital'; Wallis, 'Apprenticeship and training'. See also Van Zanden, 'The skill premium', pp. 139-40.
3 Mitch, 'The role of education and skill'; Sanderson, 'Literacy and social mobility'. For a later period see Sanderson, Education and economic decline in Britain.
4 Becker, Hornung, and Woessmann, 'Education and catch-up'; Sandberg, 'The case of the impoverished sophisticate'.
5 Mokyr, The enlightened economy, pp. 106–21.
6 Snell, 'The apprenticeship system in British history'; More, Skill and the English working class; Knox, 'Apprenticeship and de-skilling'.

and the transformation of business structures required more skills on behalf of both white-collar and blue-collar workers.[1] Yet the interplay between formal education and on-the-job training during this stage remains unclear. Education historians in the 1970s and 1980s not only overlooked on-the-job training but also discarded the link between the education system and the labour market because they considered it either impossible to measure, or maintained that secondary schools only preserved the elite's access to the professions - a proposition that has been questioned.[2] More recently it has been posed that post-elementary education was actually central in providing skilled workers from the second half of the nineteenth century onwards, and that employers increasingly selected workers based on their formal qualifications.[3] Others have nonetheless demonstrated that some firms still resorted to on-the-job training and internal labour markets to acquire skilled workers.[4]

These opposing findings are perhaps explained by divergent skill demands between employers. For instance, a firm employing clerks may have preferred general schooling, whereas craftsmen needed workers with vocational skills in order to reduce their provision of on-the-job training. What is more, employers may well have adapted their hiring process, and the use of on-the-job training, based on the availability of general and vocational schools, as a degree could lower selection and training costs.[5] Although the literature on vocational education and training regimes (VET) has come a long way in explaining the emergence of present-day skill formation regimes, it generally fails to differentiate between different types of workers and varying demand for skills.[6] As a result there is still very little historical research examining the selection of different types of workers during the long nineteenth century, especially on a

1 Green, Education and state formation; Goldin and Katz, The race between education and technology; Chandler, The visible hand; Schulz, Maas, and Van Leeuwen, 'Occupational career attainment'.
2 Ringer, Education and society in modern Europe; Müller, Ringer, and Simon, The rise of the modern educational system. For a reassesment see Anderson, 'The idea of the secondary school'.
3 Brown, Van Leeuwen, and Mitch, 'The history of the modern career', p. 14; Schulz, Maas, and Van Leeuwen, 'Employer's choice'.
4 Seltzer, 'Internal labour markets'; Boot, 'Salaries and career earnings'; Stovel, Savage, and Bearman, 'Ascription into achievement'.
5 Van de Werfhorst, 'Skills, positional good or social closure?'; Allmendinger, 'Educational systems and labor market outcomes'.
6 Ashton and Green, Education, training, and the global economy; Ashton, Sung, and Turbin, 'Towards a framework' . A notable exception is Thelen, How institutions evolve.

micro-level, nor is it known how the coming of different schools affected this selection.[1]

This thesis examines the adaptiveness of institutional skill provision for The Netherlands by employing a case-study approach. The Dutch setting is interesting because it provides several settings to study the effects of educational change on the provision of different groups of skilled workers. The Dutch economy prospered during the seventeenth century, and witnessed a protracted decline afterwards.[2] Rapid, but relatively late industrialisation setting in from the 1850s put pressures on post-elementary education, which had hardly developed since the seventeenth century.[3] Moreover, with the end of the Dutch Republic, an arguably central institution for acquiring crafts skills - the guilds - had disappeared. The effect of the disappearance of craft guilds on skill formation has rarely been examined.[4] As in most Western European countries several attempts were made in The Netherlands to change the education system during the second half of the nineteenth century.[5] In contrast to these countries, however, there was a relatively large scope for local initiatives to develop, affecting the provision of skilled workers.

The different case-studies will demonstrate that over the course of the period 1750-1920 on-the-job training gradually disappeared in favour of formal schooling provided and largely funded by municipalities. Shifting a large share of training costs from firms and workers to tax payers meant that employers could increasingly select on formal credentials instead of training workers themselves. This process of shifting the provision of skilled workers to schools was nevertheless not a straightforward process. While guilds are often hallmarked as institutions essential for apprenticeship training to function, in The Netherlands they only appear to have restricted access to training.[6] Education changes implemented by the central government were also not always effective, and were at times relatively late to develop. While higher education was already reformed and increasingly publicly funded by 1815, the reorganisation and funding of secondary and vocational schools by the central government lagged. Moreover, all too generous funding of university students caused an oversupply of graduates. Even when general secondary schools were eventually established by the central government in

1 Schulz, Maas, and Van Leeuwen, 'Employer's choice', p. 50;Brown and Neumeier, 'Working class careers'.
2 De Vries and Van der Woude, The first modern economy.
3 Boekholt and De Booy, Geschiedenis van de school in Nederland, pp. 119-20.
4 With the exception of Humphries, 'Rent seeking or skill creating?'.
5 Green, Education and state formation.
6 Epstein, 'Craft guilds'.

1863 they also did not completely serve their intended purpose. Consequently, it was not at all apparent that educational institutions were directly, or at all, able to meet changing demand for skilled workers. Not every institution necessarily provided a good answer to economic needs.[1]

Nonetheless, the relative autonomy of local authorities such as city boards and municipalities enabled to tweak educational changes implemented by the central government, and thereby eventually provided a solution to the provision of skilled workers. This setting affected the supply of skills significantly. It was for a large part due to intervention by these local authorities that a match between supply and demand for skilled workers came about. Only later on were these local initiatives incorporated into the general education system, and did they receive more government funding. This suggests that the role of local institutions may be principal to our understanding of the match between supply and demand for skills.

This importance of local institutions falls within a larger literature arguing that it was predominantly through local authorities that a match between the supply and demand for education could be achieved in this period.[2] Where this literature has focussed on local decision making, it is argued here that the degree to which local authorities could adapt top-down implemented education policy to local circumstances was of importance in the Dutch case as well. Before elaborating upon the Dutch case, however, a theoretical note is required to understand the constraints faced by governments and firms when providing training.

Understanding the match between the supply and demand for skills

Matching supply and demand for skilled workers is not straightforward because states may have had alternative motives when providing schooling, while firms were not always willing to bear the costs or risks involved in training. Moreover, inefficiencies in organisation and funding may have caused a mismatch between attendance levels and demand for skilled workers. In turn, firms adapt their hiring process and the subsequent training of employees based on the extent to which the availability of education is relevant to the occupation, and on what a degree signals to employers.[3] Consequently, providing skilled workers is

1 Cf. Ogilvie, ''Whatever is, is right'?'; Knight, Institutions and social conflict.
2 Lindert, Growing public ; Goldin, 'The human-capital century'; Westberg, 'Stimulus or impediment?'.
3 Allmendinger, 'Educational systems and labor market outcomes.'

affected by the interplay between formal education and firms.

The development of education systems has been studied extensively by historians in the 1970s and 1980s. Their studies emphasised that educational changes in this period occurred relatively autonomously from economic developments or changing demands from industry.[1] Influenced by Bourdieu's theory on cultural reproduction, it was instead argued that many nineteenth-century changes in European education systems were driven by a process of social demarcation and systematisation, whereby those in power used education as a means to maintain their status within society.[2] Müller for example demonstrated that the early nineteenth-century German *Gymnasium* initially was a socially accessible school, but that during this century it became more and more socially exclusive and reinforced elite formation.[3] Ringer argued that in France the same patterns could be observed.[4]

Although this focus on class structures has been criticised, it is apparent that education systems have not always developed out of economic needs alone.[5] The desire to promote political cohesion or citizenship, lobbying by educational reformers, the notion that education should follow class lines, or a political elite-interest biased towards a classical education, are just some examples that possibly obstructed the link between education and the labour market.[6] But however valid these findings may be, this literature tends to overlook that skilled workers were still needed during this period.[7] Due to the focus on social mobility and segregation it has not been examined how employers responded to an education system that may not have sufficiently trained adolescents for the labour market.

Even if schools did teach (some) skills required for the labour market, an undersupply of schools and pupils could still have frustrated the shift of skill formation from firms to the education system. For instance, it has been demonstrated that differences in political organisation go a long way in explaining the supply of

1 Ringer, 'Introduction'.
2 Ringer, 'Introduction', pp. 5-7; Archer, Social origins.
3 Müller, 'The process of systematisation'.
4 Ringer, Education and society in modern Europe.
5 Anderson, 'The idea of the secondary school'; Locke, The end of the practical man.
6 Anderson, 'Secondary education in mid nineteenth-century France; Ashton and Green, Education, training, and the global economy, p. 38; Day, 'Technical and professional education in France'; Herbst, 'Nineteenth-century schools between community and state, p. 317.
7 Galor and Moav, 'Das human kapital'.

schools.[1] A notable contribution has been made by Lindert, who examined why patterns of elementary school attendance greatly differed between many Western countries throughout the nineteenth century.[2] He concluded that these patterns to a large degree can be explained by the degree of elite self-interest in politics, the extent of the franchise, and central-local relations. Lindert argues that especially in the early stages when the national franchise was still limited, 'local autonomy liberates the areas with stronger demand to go ahead with their local public schools'.[3] When decisions on the funding of schools were made locally, only a majority of the local voters or representatives needed to be in favour of increased education provision. If such a decision had instead been made on a central level, the balance of power would still be against them.[4] This explains why high levels of decentralisation in political decision making initially led to more schooling in several countries.[5] Goldin has argued that in the late nineteenth-century United States secondary schools too emerged because they were funded and controlled by small districts.[6] Exploiting a comparable decision-making model as Lindert, she shows that decentralisation caused secondary schools to emerge whenever a majority of the local population was in favour.

Other studies have focussed on different characteristics than local political autonomy to explain why decentralisation worked better than centralisation in early stages in the provision of education. Beadie has pointed out that the structure of local education provision in the United States was only possible because of existing practices of local self-regulation.[7] She further argued that awarding authority to local school districts further promoted the expansion of schooling.[8] Westberg demonstrated that not decision making but financial control of school funds at the local level stimulated the development of Swedish elementary schools during the nineteenth century.[9] Conversely, Green sees the absence of local authorities in nineteenth-century England as an 'enormous handicap' in setting up an education system.[10]

1 Stoddard, 'Why did education become publicly funded?'; Lindert, 'Revealing failures'; Mitch, 'Underinvestment in literacy?'.
2 Lindert, Growing public.
3 Lindert, Growing public, vol I, p. 127.
4 Lindert, Growing public, vol I, pp. 104-5.
5 Engerman, Mariscal, and Sokoloff, 'Schooling, suffrage, and the persistence of inequality; Go and Lindert, 'The uneven rise of American public schools'.
6 Goldin, 'The human-capital century'.
7 Beadie, 'Education, social capital and state formation'.
8 Beadie, 'Education, social capital and state formation', p. 58.
9 Westberg, 'Stimulus or impediment?'
10 Green, 'Technical education and state formation', p. 138.

Albeit through different mechanisms, all these studies demonstrate that the development of education systems was aided by decentralisation. Seeing the benefits of decentralisation, it may not be a coincidence that the education historians of the 1970s and 1980s found no link between schools and the labour market. After all, most of the countries they examined were characterized by centralized education systems.[1] This may have prevented to alter the education system in favour of providing more skilled workers. Goldin has indeed demonstrated that local provision of secondary education allowed for a close match between schools and the labour market in the United States.[2]

Skill formation does not need to take place through formal education alone. Firms desiring skilled workers can try and obtain them on the labour market, or train workers themselves at some costs. The cheapest solution is to acquire workers on the labour market by trying to poach skilled workers from firms that already have provided training, by offering them a wage premium. Firms that do not provide training are able to offer higher wages because they do not have to bear the costs of training. However, this risk of poaching causes the training firm to refrain from investing in training at all, because it is not certain that the trained worker will stay at the firm. Since it is difficult to force workers to stay, firms are generally unable to capture the rewards of training investments. As a result they have little incentive to pay for training as long as the skills their workers require are transferable across firms.[3]

This risk does not mean that on-the-job training will not take place at all, and that schools are the only route towards skill formation. Becker argued that the poaching risk ensures that workers will be paid the full value of their marginal productivity on the labour market (i.e. higher wages). The benefits of higher wages acts as an incentive for workers to acquire training.[4] Not firms but workers therefore are the sole beneficiaries of training, which means that not firms but workers should pay for training.[5] Although this argument by Becker has

1 A notable exception is Prussia, and it is debated whether its education system should be considered centralised; Lindert, Growing public, vol I, p. 115; Nipperdey, 'Mass education and modernization, p. 158; Müller, 'Systematisation: the case of German secondary education', p. 19; Herbst, 'Nineteenth-century schools between community and state, p. 338.
2 Goldin and Katz, The race between education and technology, pp. 164–72.
3 When skills are firm-specific the marginal productivity can only be used within that firm, which implies that there is no risk of poaching. Firms and workers will then usually share training costs because wages will be above the external market wage but below marginal productivity; Thelen, How institutions evolve, p.12.
4 Thelen, How institutions evolve, p. 12.
5 Becker, Human capital, p. 40.

been modified in some respects - most notably when considering training in imperfectly competitive labour markets -, this basic tenet has been accepted.[1]

But also in this framework still some issues arise. First, workers need to be able to demonstrate their skills to other firms to capture the returns to training, and they need to be sure that the training they receive is of quality. Firms, on the other hand, may have an incentive to withhold such information to prevent their workers from acquiring higher wages elsewhere. Some regulation and certification of on-the-job training is therefore required to ensure and demonstrate training quality, and to capture the returns to training. This is why in many countries governments and other organisations today provide training regulation and certificates to ensure quality and pay-off.[2]

Second, the sooner a worker will invest in training the higher his future returns will be. Investing in training is therefore most rewarding when the worker is least able to pay training costs, namely at the very beginning of his career. As a result, a major issue in on-the-job training is to ensure that credit or financial constraints do not prevent the provision of skilled workers. One solution to pay for training is to accept lower wages during training, but this may not be feasible for the worker. Another solution is that firms advance training costs. These can be recouped by making the worker provide labour at below-market wages for a specified period after training is completed, but also this requires some contractual arrangement preventing the workers from switching jobs. Again this is where collective bodies or governments can step in.

Larger firms can also try to recoup training costs by reducing workers' mobility through internal labour markets.[3] Internal labour markets are characterized by a single port of entry; upper-level positions are filled by internal promotion only; relations between employer and employee are long-term; and wages are set according to impersonal rules.[4] Lengthy tenure warrants that the costs of training can be recouped over the long run. Usually wages would increase according to the length of tenure at the firm. By providing delayed compensation workers are enticed to stay at the firm, while the formalisation of career ladders and wages ensured workers that they would at some point receive higher wages. Moreover, if internal labour markets are commonplace within an industry the opportunities to capture higher wages at other firms are limited because all workers start at entry-level positions.[5]

1 Acemoglu and Pischke, 'Beyond Becker'.
2 Busemeyer and Trampusch, The political economy of collective skill formation.
3 Van Leeuwen and Maas, 'Historical studies of social mobility', p. 439.
4 Seltzer, 'Internal labour markets'.
5 Seltzer and Simons, 'Salaries and career opportunities', p. 222.

Thus, in the absence of schools providing the right type of skills, workers can be trained on-the-job within the firm, and there are several mechanisms to ensure that on-the-job training does not hamper the supply of skilled workers. Nevertheless, all require quite elaborate arrangements between workers and employers, or between firms and other institutions, either in enforcing training quality or in safeguarding returns to training. The arrangements needed to provide skilled workers through on-the-job training can be partly or altogether circumvented by skill formation through schools. Indeed, the absence of training regulation in the United States encouraged the growth of trade schools during the nineteenth century.[1] Shifting the costs of skill provision to taxpayers then seems a promising alternative for employers.

However, also this route towards providing skilled workers is not without its problems. Next to the political economy issue introduced above, it is not always clear what schools precisely contribute to the provision of skills, or if they increase skills at all. Although this question has rarely been posed by historians, economist and sociologists have been debating what schools actually do for some time. Analysing their theories can help to understand the historical link between schools and the labour market.

It is generally believed that schools change people to make them more attractive to employers.[2] The precise mechanism through which they are made more attractive is nevertheless subject to debate. First, most economist would simply state that education increases the productivity of the worker. This is the view dominant in many economic theories, notably in the human capital theory of Becker.[3] Higher schooled applicants are considered more productive, thereby increasing their earnings and their chances on acquiring jobs with high skill demands. This theory is often incorporated in economic history as well, where it is generally believed that human capital formation, often measured by literacy levels or years of schooling, stimulates economic growth.[4]

Others scholars hold that education does not increase productivity but instead helps to evaluate the productive capacities of applicants, as a result reducing uncertainties in the hiring process. Employers then do not prefer more schooling because these applicants have higher levels of productivity, but because screening on applicants with a degree reduces the chances of hiring

1 Owen. 'An economic perspective on career formation', p. 49.
2 Bills, 'Credentials, signals, and screens', p. 450.
3 Becker, Human capital.
4 See for instance Galor and Weil, 'From Malthusian stagnation to modern growth'; Galor and Moav, 'From physical to human capital'; Becker and Murphy, 'Human capital, fertility, and economic growth'.

someone who is incapable of performing the job.[1] A comparable interpretation is proposed by the signalling theory, which holds that applicants acquire degrees to differentiate themselves from others. In this interpretation applicants acquire degrees to signal their skills to employers, thereby improving their chances of being hired.[2] It is important to note that in both the screening and signalling theory the skills between degree and non-degree holders may theoretically be alike. Degrees mainly serve to reduce the information asymmetry between firms and applicants: firms screen and job seekers signal.[3] In both human capital theory and signalling and screening theory the contribution of formal education can be considered positive from a labour market perspective, since it improves the match between the supply and demand for skilled workers: either education increases the pool of skilled workers, or it lowers selection and hiring costs because a degree increases the observable characteristics of the applicant.

A third understanding of the role of education are theories of credentialism. Credentialism states that degrees do not sort people based on skills but instead serve to monopolize access to occupations by people with certain cultural dispositions.[4] Building on Bourdieu, it holds that degrees are used to uphold a cultural hegemony by social groups, and that the higher educated use degrees to monopolize access to certain occupations. Education is here used to demonstrate cultural capital and to exclude others. In this view elite groups manipulate the education system to their economic advantage, where education does not confer skills but status instead. Employers are then not concerned with selecting on skills but with identifying that the applicant belongs to the same social group. Thus, in contrast with the other theories, degrees bear little relation with skill levels.

Another strain of credentialism argues that the growth of primary and secondary education from the turn of the century caused a 'credential inflation'. Due to increasing attendance levels from the beginning of the twentieth century job seekers would try and increase their education level especially to uphold their claim to prestigious occupations, consequently leading to a mismatch between skill demands and credentials.[5] There may indeed be some competence in the claim that changes in employers' hiring preferences may not always have been caused by changing demand for the skills needed at the work place. It cannot be

1 Brown, 'The social sources of educational credentialism', p. 22.
2 Connelly et al., 'Signaling theory'.
3 Bills, 'Credentials, signals, and screens', p. 446.
4 Brown, 'The social sources of educational credentialism', p. 20.
5 Brown, 'The social sources of educational credentialism', p. 24.

denied that especially the last two decades have seen growing degree requirements for jobs that earlier required less credentials.[1] There are also historians who argued that access to education was restricted in order to prevent credential inflation, consequently ensuring that the middle and upper-classes could continue to use degrees as a proxy for cultural capital.[2] On the other hand, it seems unlikely that employers, especially those outside the traditional professions, were more preoccupied with the status of the applicant than his aptness for the tasks he needed to perform.[3]

It is difficult to test what schools actually do for employers, because it is not apparent how the different theories introduced above should be tested. For instance, youths may be positively selected into schools, i.e. the most talented choose the most education. In that case higher earnings may not have been caused by more education.[4] Credentialism is also difficult to measure, since the wages of overvalued workers will (eventually) flatten out because their education level exceeds their actual level of skill.[5] Even in contemporary research and with abundant data at hands, there is no consensus as to how to tackle issues like these. Nevertheless, it has been proposed that the type of education may explain its use for employers and applicants. Hence, each of the theories outlined may well have been valid for some types of education but not for others.

Allmendinger has made an important contribution to the understanding of the match between education systems and the labour market.[6] She argued that occupational status is highly determined by educational attainment whenever education systems are stratified. In stratified systems job changes occur less frequently at the beginning of the career because the link between education and occupation is stronger. Conversely, when education systems are not stratified the link between educational attainment and occupational status is less pronounced. In this case the match between education and the labour market is less clear, resulting in more job-hopping at the beginning of the career. In other words, whenever there are high levels of differentiation within the education system employers are better able to evaluate the skills of pupils from each sepa-

1 Green and Zhu, 'Overqualification, job dissatisfaction'; Pitcher and Purcell, 'Diverse expectations and access to opportunities'.
2 Labaree, 'Curriculum, credentials, and the middle class'; Beadie, 'From student markets to credential markets'.
3 Bills, 'Credentials, signals, and screens', p. 451.
4 Bills, 'Credentials, signals, and screens', p. 449.
5 Bills, 'Credentials, signals, and screens', p. 453.
6 Allmendinger, 'Educational systems and labor market outcomes'.

rate track, leading to better matching. Several studies have confirmed that this hypothesis indeed seems to hold.[1]

Van de Werfhorst has also pointed out that the different use of education by employers is strongly connected to the availability of education.[2] When vocational tracks are prevalent, employers can, and do, select more on productive skills. As a result there is a strong link between skills and the wage level. Conversely, when education mainly teaches general skills it serves as a screening device for trainability. Applicants then use education as a positional good to distinguish themselves from others. But as employers cannot readily use these skills on the work floor, more education in this setting does not lead to higher wages, but it does increase chances of securing a job.

Van de Werfhorst further expanded the argument of Allmendinger by demonstrating that educational qualifications are rewarded differently between industries.[3] Thus, education does different things per type of labour market considered. Sometimes a degree indeed indicates more human capital or skills, while in other cases it is used by employers to signal plausible marginal productivity, i.e. trainability of the applicant. By studying different labour markets Van de Werfhorst for instance found that employers select on human capital when immediate productivity is wanted and contract duration is uncertain, for example in manufacturing industries. When longer-term contracts can be offered, more training can be provided on-the-job, which reduces the need to select on human capital. Employers will then more frequently use education as a screening device because degrees then signal relative trainability. Large bureaucratic organisations will use this screening option more often than smaller and open organisations, because they can use internal labour markets for further skill formation.[4] However, as introduced above internal labour markets could also serve to recoup training costs in the absence of suitable forms of education, so it seems that the causal mechanism can work in both directions.

To summarize, the literature proposes firstly that decentralisation aids the match between schools and the labour market; secondly that studying the interplay between formal education and firms is required to understand the provision of skilled workers; and thirdly that the function of a degree and the subsequent need for on-the-job training may vary according to the type of education and the type of occupation. The function of a degree arguably varies

1 Andersen and Van de Werfhorst, 'Education and occupational status'; Brzinsky-Fay, 'Lost in transition?'.
2 Van de Werfhorst, 'Skills, positional good or social closure?', pp. 542-3.
3 Van de Werfhorst, 'Skills, positional good or social closure?'.
4 Van de Werfhorst, 'Skills, positional good or social closure?', p. 527.

mostly between vocational and general education. Consequently, understanding the match between demand and supply of skilled workers requires an examination of the interplay between both general and vocational schools on the one hand and on-the-job training on the other, for different types of occupations. For The Netherlands different case-studies can be selected to examine this interplay historically.

Education and industrialisation in The Netherlands

During the period 1750-1920 several educational and labour-market changes took place within The Netherlands that enable to examine which educational setting was conducive to the provision of skilled workers. Before 1820 skill formation for the crafts was regulated by guilds, and after that was left to employers. The Netherlands relatively quickly industrialised from the middle of the century and this required changes in the training of industrial and white-collar workers. Both general and vocational schools were consequently founded from the second half of the nineteenth century, so we can compare how each contributed to the provision of different types of skilled workers. Moreover, although The Netherlands became a parliamentary monarchy during the nineteenth century, Dutch municipalities regained relatively much autonomy throughout the period.

Around 1750 the education system of the Dutch Republic was relatively limited. Elementary schools did exist in quite large numbers and as a result literacy was probably relatively high compared to other, especially southern European, countries.[1] Institutions providing post-elementary education were nevertheless few in numbers, and mostly aimed towards educating the elite for the professions.[2] From 1815, when William I became the first king of the new Kingdom of the Netherlands, few changes were made in the supply of post-elementary education until the second half of the century.[3] Higher education was nevertheless reformed in 1815, and the effects of this policy change for the labour market will be examined in one of the case-studies.

The absence of institutions for post-elementary education may not have

1 Baten and Van Zanden, 'Book production and the onset of modern economic growth', p. 221.
2 Frijhoff, 'Crisis of modernisering?'; Frijhoff, 'De arbeidsmarkt voor academici tijdens de republiek'.
3 Frijhoff, 'Onderwijshervorming in de Franse Tijd'; Mandemakers, HBS en gymnasium, pp. 41-64; Goudswaard, Vijfenzestig jaren nijverheidsonderwijs.

been a serious problem since many skills were picked-up on-the-job, through apprenticeships, and because demand for skilled workers before industrialisation may have been relatively limited. Moreover, it has been argued that craft guilds, by regulating apprenticeships, may have ensured that sufficient artisans were provided.[1] However, with the abolishment of the guilds around 1820 and the onset of industrialisation a couple of decades later, this issue of providing post-elementary education became more pressing.

As explained, Van Zanden and Van Riel have argued that the process of Dutch industrial catch-up that started during the second half of the nineteenth century was to a large extent triggered by the central government.[2] The victory of centralized rule over local rule and local particularism that had characterized the preceding centuries was removed by the abdication of king William I and the introduction of a new constitution in 1848. Van Zanden and Van Riel argue that this new constitution placed The Netherlands firmly on the path towards modern economic growth. Because of the revised power of the central government local tariffs and excises were finally abolished, trade was liberated, local particularism was discouraged in favour of promoting integration of national markets (such as coal), currency was standardized, and government finances were put on a more solid footing.

As a result of these changes the Dutch economy began a process of relatively rapid industrialisation. The agricultural sector declined in favour of industry, trade, and commerce. In the latter two sectors productivity and value added increased substantially. Industrial firms gradually increased in size and the share of the workforce employed in industry and services grew substantially, to the detriment of those working in agriculture. The use of steam power increased and stimulated mechanization, while the abolishment of tariffs together with the telegraph and railways promoted internal trade, reduced price variation, and lowered the costs of raw materials.[3]

Due to industrial catch-up, impressive changes in Dutch educational attendance took place between the 1860s and the 1920s. It was during this period that many new types of schools were founded, such as different vocational day and evening schools, secondary schools and commercial (evening) schools. These schools aimed at educating the populace for the growing demand from trade, commerce, and industry, where, as can be seen in Figure 1.1, demand for workers increased rapidly during this period. The share of adolescents between the ages of thirteen to eighteen enrolled in post-elementary education increased

1 Van Zanden, 'The skill premium.'
2 Van Zanden and Van Riel, The strictures of inheritance.
3 Van Zanden and Van Riel, Nederland 1780-1914, chapter 6.

from less than one per cent in 1859 to an estimated twenty per cent in 1920, suggesting that educational development kept track with increasing demand for workers.[1]

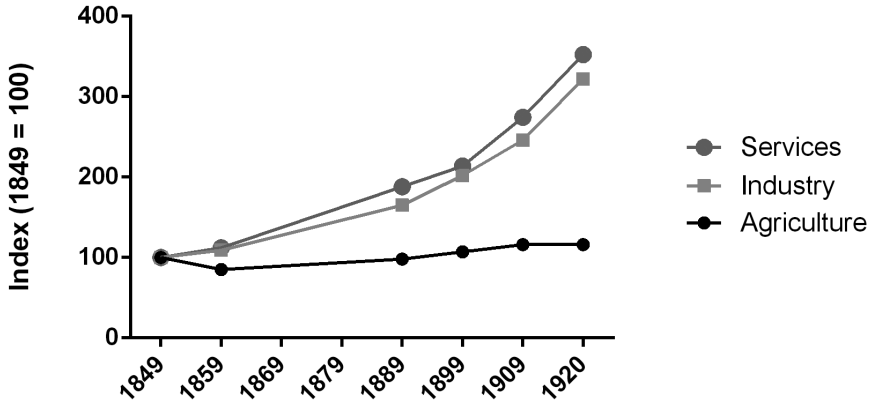

Figure 1.1: Development of the Dutch labour force (male).

Source: 13e Algemene volkstelling 31.5.1960. Deel 10: Beroepsbevolking. C. Vergelijking met de uitkomsten van de beroepstellingen 1849-1960 (Hilversum, 1966), staat 1 and 3.

Whereas efforts of the central government to a large degree explain this process of economic growth, the subsequent process of adapting educational institutions may have been rooted at the local level. This contrast emerged because shortly after the 1848 constitution had come into effect, quite some authority was given back to the municipalities. Although the relation between the central and local government had become more regulated, the new municipality law of 1851 provided quite some room for local rulers to enact their own policies, especially when it came to education.

The 1848 constitution required a revision of the relation between the central government and municipal authorities.[2] This relation had hitherto been characterized by lawlessness and had been overshadowed by the authoritarian

1 Estimate based on Verslagen Onderwijs (1859-1920) and census data from www.volkstellingen.nl (accessed December 1, 2014). Post-elementary education includes all forms of formal education after elementary school and before university. Extended elementary schools and elementary evening schools are excluded.

2 Randeraad, 'Thorbecke', p. 550.

style of rule of king William I.[1] A new law on municipalities was therefore introduced in 1851. This law delegated quite some authority from the central to the municipal level. Thorbecke, the Minister of Internal Affairs who had drafted both the 1848 constitution and the 1851 municipality law, explicitly stated that the latter aimed at stimulating and promoting local initiative, and that the central state mainly supervised municipalities.[2] According to Knippenberg, the municipality law introduced local autonomy within a national framework - a 'decentralised unitary state' in the words of Toonen.[3] Tasks that were now initiated at the municipal level were for instance care for the poor, improving public health, providing housing for poorer classes, and also providing education.[4]

The law had far-reaching effects for the organisation and funding of schools.[5] For instance, municipalities funded more than half of the total the costs of general secondary education at least until 1940, and subsidies from the central government even declined after the turn of the twentieth century.[6] Next to the financing of education municipalities also had relatively leeway in initiating educational change. The hands of municipalities were relatively tied regarding elementary education, because local funding, organisation and quality standards were laid down in several laws on elementary education.[7] Regarding post-elementary education, however, municipalities had much more leeway. For instance, the secondary education law of 1863 did not force municipalities to found general secondary schools and also the curriculum was left by and large open.[8] Also vocational training was left to local initiative. A law on vocational education only came into being in 1919. In the preceding decades municipalities had proven able to increase attendance levels more than tenfold, without receiving large subsidies.[9]

Because initiative was largely placed at the local level educational change was dependent on the efforts taken by municipal governments, at times in concordance with other parties such as societies and employers. On the one hand this caused discrepancies in education provision between towns, but on the other

1 Kocken, Van stads- en plattelandsbestuur naar gemeentebestuur, pp. 369, 582.
2 Randeraad, 'Thorbecke', p. 537.
3 Knippenberg, De eenwording van Nederland, p. 160; Toonen, Denken over binnenlands bestuur.
4 Wolffram, 'Schikken en inschikken'.
5 Karsten, 'Lokaal onderwijsbeleid in historisch perspectief'.
6 Mandemakers, HBS en gymnasium, pp. 162-3.
7 Knippenberg, Deelname aan het lager onderwijs in Nederland.
8 Mandemakers, HBS en gymnasium, p. 68.
9 Wolthuis, Lower technical education in the Netherlands, p. 152.

hand this ensured that municipalities were able to adapt educational supply to local demand.[1] In general municipalities between 1860 and 1920 were able to respond to the growing demand for different types of education. This can be observed in rising levels of local funds assigned to education. In 1862 the average Dutch city spend a negligible sum on post-elementary education, but in 1907 this had increased to more than 2,5 *guilders* per inhabitant.[2] This could translate into quite a substantial amount per pupil. For example, the Amsterdam municipality extended more than fl. 14,000 to one of its two vocational schools in 1910, corresponding to more than fl. 37 per pupil.[3] Because of this amount, tuition was more than two-thirds lower than it would have been without local public funding. In comparison, subsidies from the central government were only about ten per cent of the amount extended by the Amsterdam municipality.

From around 1920 the central government stepped in and structurally increased public funding of education - albeit irregularly during the 1920s due to financial difficulties. Scholars have argued that the Dutch education system had already reached its completion around this period.[4] Only relatively minor alterations were implemented in the education system between 1920 and 1963, when a new law on secondary education was introduced.[5] Others have demonstrated that the relative autonomy of Dutch municipalities reached its end exactly around the same period.[6] In 1917 the 'Pacificatiewet' passed, which aimed to end the increasing polarisation between confessional groups, especially with regards to the funding of elementary education. This law put an end to the *schoolstrijd* ('school battle') by permitting public funding of confessional schools. As a result government spending on education massively increased. This gradually reduced the control of municipalities over education, because with increased central funding came increased central control.[7]

It might not be a coincidence that the Dutch education system had already reached maturity before this development, during a period when municipalities had a relatively large say over it. In line with the findings by Lindert and Goldin for other countries, this suggests that adaptability at the local level may explain

1 Boekholt and De Booy, Geschiedenis van de school in Nederland, p. 151-2.
2 Knippenberg, De eenwording van Nederland, p. 164.
3 Verslag Onderwijs (1910). The other Amsterdam vocational school even received more funding, but its subsidies are not recorded.
4 Idenburg, Schets van het Nederlandse schoolwezen.
5 Amsing, Greveling, and Dekker, 'The struggle for comprehensive education in the Netherlands', pp. 461-2.
6 Wolffram, 'Schikken en inschikken', p. 102.
7 Boekholt and De Booy, Geschiedenis van de school in Nederland, pp. 238-9.

the sizeable educational changes occurring in The Netherlands during the long nineteenth century. Consequently, a larger role may have to be assigned to the initiatives undertaken by Dutch municipalities when explaining the process of industrial catch-up between 1860 and 1920. After all, without the provision of sufficient workers it is possible that economic progress at some point would have petered out.

Although the effect of industrialisation and educational attainment on social mobility has been studied extensively, the actual match between industrialisation and post-elementary schooling remains largely disregarded.[1] This thesis aims to fill this gap for The Netherlands by examining if, and how, adaptability of post-elementary education ensured that sufficient workers were educated, both through formal schooling and on-the-job training.

Methodological and empirical contribution

It has been argued that especially post-elementary education in this period aimed towards training for the labour market.[2] Moreover, elementary schooling lost its distinguishing function for the Dutch labour market because attendance rates of boys were relatively high from the second half of the nineteenth century.[3] Since practically all boys could read and write, being literate did not increase chances of career success.[4] Elementary education needed to be combined with more training or schooling to increase chances on a skilled occupation, and these skills could either be obtained through post-elementary schooling or by acquiring them on-the-job. Theory suggested that the use of education for employers depended on the type of occupation, but also indicated that employers may have changed their hiring policies when the provision of education increased. It is therefore to be expected that the match between education and the labour market differed between occupations and between different types of post-elementary education. Consequently, this thesis consists of separate papers that examine how changes in the supply of different types of post-elemen-

1 On the link between industrialisation, education and social mobility see for instance Leeuwen and Maas, 'Historical studies of social mobility'; Schulz, Maas, and Van Leeuwen, 'Occupational career attainment during modernization'; Zijdeman, 'Like my father before me'.
2 Knippenberg, 'Het hart van Nederland: de provincie Utrecht in de periode 1800-1940', p. 26.
3 Boonstra, De waardij van eene vroege opleiding.
4 Boonstra, 'Functioneel analfabetisme in Nederland, 1775-1900', p. 139.

tary education affected the supply of skilled workers for separate segments of the labour market.

All papers take an institutional change in the provision of post-elementary education as their focal point to examine what the effects were of these educational changes on the supply of skilled workers. The effects of changes in educational provision on different labour markets is evaluated through different empirical strategies and by using newly collected archival data throughout. All papers employ a micro-level approach to see how changes in the supply of schooling affected chances on the labour market, such as access to job and wages, for individual adolescents. This was achieved by using various types of newly collected data on individual educational attainment and individual earnings. Through comparing these labour-market characteristics of different groups of pupils, the effect of educational changes can be evaluated. Moreover, by estimating the skill premium (i.e. the ratio of skilled versus unskilled wages) it is further possible to assess the success of each educational adaptation.[1] Furthermore, by taking a time-frame of several decades after educational changes were implemented, each paper is further able to evaluate if and how educational institutions adapted successfully to demand for skilled workers. Did employers prefer certain degrees over others, and how did new schools affect their provision of on-the-job training and the payment of workers?

The papers employ a micro-level approach because crude enrolment rates alone fail to capture the interaction between formal schooling and on-the-job training. For instance, Schulz, Maas, and Van Leeuwen recently found that the presence of a secondary school increased occupational status in The Netherlands during industrialisation, but the presence of a top-100 company contributed relatively more to career success.[2] This may point towards the importance of on-the-job training (as larger firms may have provided more training), but it could also suggest that the proxy they used to measure education, namely the number of students enrolled in secondary education per 100 inhabitants, might be too general.[3] Although using micro-level data on pupils may come at the costs of fewer observations, it does provide a deeper understanding of the match between different types of schooling and the selection of employees.

Nevertheless, the micro-level approach resulted in data on a large number of pupils making the move from schools to the labour market, as well as giving

1 Zanden, 'The skill premium'; Goldin and Katz, The race between education and technology, p. 91.
2 Schulz, Maas, and Van Leeuwen, 'Occupational career attainment', p. 16.
3 A point they acknowledge; Schulz, Maas, and Van Leeuwen, 'Occupational career attainment', p. 19.

a detailed insight into on-the-job training before and during Dutch industrialisation. Even after excluding the enrolment data obtained from education reports, this thesis presents new data on labour-market access, tuition fee funding, and wages of hundreds of Dutch adolescents. Occupations of 2,400 secondary school pupils have been collected; on-the-job training and wages of more than 1,200 adolescents have been traced from beginning to end; occupations of 1,500 nineteen-year-olds in conscription lists have been linked to their education levels; 1,600 wages of over 300 Amsterdam white-collar workers during their tenure have been collected; the schooling and working experience of about 400 skilled clerks has been analysed; and tuition fee funding and attendance level patterns of hundreds of Reformed and Catholic theology students have been reconstructed and linked to labour-market data. This diverse combination of sources enables the different papers to closely examine the shifting balance between employers and public authorities in training and schooling skilled workers for the Dutch labour market between 1750 and 1920.

Every chapter uses a somewhat different methodology and contributes to a separate literature, as will be explained in the separate chapters. All nevertheless examine if and how educational changes affected the supply of skilled workers. Chapter two tackles the long-standing debate on whether guilds were needed to ensure preindustrial skill formation in the crafts, as was amongst others suggested by Van Zanden.[1] In an uncommon approach this chapter combines the early modern and modern period to examine what the effect was of the abolishment of the Dutch guilds around 1820 on the training of craftsmen. This is evaluated using unique and homogenous data on the apprenticing of hundreds of Dutch orphans in the eighteenth and nineteenth centuries. The chapter demonstrates that guilds at least in the eighteenth century did not enforce apprenticeship contracts, and were therefore not needed for craft training before industrialisation. This suggests that guilds may never have been important for the training of skilled craftsmen. Moreover, the chapter shows that rent-seeking could occur when local particularism was not checked, as it was in the nineteenth century. After the guilds Dutch were abolished apprenticeship training functioned better than before because guilds no longer limited access to craft training.

Partly using a comparable strategy, the third chapter expands on the issue of on-the-job training for blue-collar workers during Dutch industrialisation between 1860 and 1920. As argued, on-the-job training may have become impractical because of ongoing mechanization and an increasing division of labour. Again using data on orphans, it is indeed shown that in Amsterdam on-the-

1 Van Zanden, 'The skill premium'.

job training dwindled from at least the last quarter of the nineteenth century. By linking militia registers to enrolment lists of vocational schools it is subsequently demonstrated that these schools, funded by municipalities, increasingly replaced this system of insecure on-the-job training, and provided significantly better access to skilled vocational occupations. At the same time they reduced the chance of becoming an unskilled blue-collar worker. Wages of these adolescents nevertheless indicate that employers did not pay a premium for pupils with a vocational degree. The declining skill premium after the turn of the twentieth century suggests that they were in ample supply, perhaps because attendance of vocational schools was stimulated by municipalities through levying relatively modest tuition fees.

Chapter four further examines educational change during the period of Dutch industrialisation between 1860 and 1920, but takes changes in the education of white-collar workers as a starting point. With growing trade and industry demand for these workers surged, and educational institutions needed to be adapted to match demand. The paper follows different groups of pupils to estimate if the flow from secondary schools to the labour market for white-collar workers was adequate. As in chapter three, wage trends and the skill premium are used to evaluate the success of educational adaptiveness. It is demonstrated that the secondary schools installed by the central government (the *Hoogere Burgerschool*, or HBS) did not provide sufficient white-collar workers. Therefore, municipalities stepped in and funded commercial schools. After these schools were founded and attendance increased, the wages of skilled white-collar workers significantly declined. Large firms such as the *Nederlandsche Handel-Maatschappij* showed a clear preference for these pupils. This firm only needed to pay a premium for these pupils during a short period as attendance increased quickly after 1900. Moreover, for relatively lower-skilled clerks part-time commercial schools were also founded by municipalities, again charging low tuition fees. These schools were accessible to such a degree that wages for lower-skilled white-collar workers, and their skill premium, also dropped after the turn of the twentieth century, as is demonstrated by the wages paid to new employees by two Amsterdam banks.

The benefits of organizing education at the local level in matching demand for skilled workers is also apparent in chapter five on Dutch higher education during the nineteenth century. After the French period Dutch universities were coordinated and funded by the central government for the first time. This may have affected study costs, access to higher education, and subsequently labour-market supply. To assess how the distribution of study grants (for the first time funded by the central government) and the level of tuition fees could have affected access to higher education and labour-market supply, the chapter ex-

ploits a 'natural experiment', in which two comparable groups of students enrolled in different institutions of higher education. Such an experiment is only available for theology students, since Reformed vicars were educated at public universities and Catholic priests at privately operated regional seminaries.

Regional Catholic seminaries were better able to adjust the supply of students to labour-market demand, which was stimulated by the control of funds, and student funding, at the local level. Because Reformed students were too generously funded by the central government, and because private grants reinforced attendance levels, Reformed vicars were in structural oversupply during the nineteenth century. In comparison, seminaries used study grants and tuition fee policies to match the number of graduates much more closely to demand for priests. This implies that the way in which students received funding had important consequences for the flow of graduates to the labour market. As a result, this could suggest that also the training of other students, such as engineers and others professional groups, could well have been affected by the level of organisation and the funding of higher education.

All chapters thus find that the match between education and the labour market was first and foremost successful when educational adaptation was rooted at the local level. Through local adaptation it seems that demand for skilled workers for different segments of the labour market was eventually matched. Although guilds were not needed for the training of skilled workers before industrialisation, the local funding of schools did ensure that the provision of skilled craftsmen and white-collar workers kept up with increasing demand, while also making up for the insecurities that hampered on-the-job training. While replacing on-the-job training with formal schooling may have increased training costs for adolescents - as they could no longer combine working and training - it did ensure skill certification and consequently enhanced labour-market access. Also, local funding allowed tuition fees to be relatively modest. This may explain why attendance levels of post-elementary schooling increased tremendously from the turn of the century, even while wage benefits gradually diminished. Furthermore, the central government eventually acknowledged the steps taken by local authorities in adjusting the provision of education. The generous funding of university students was gradually reduced and aimed more towards talented students from the end of the nineteenth century.[1] More importantly, commercial schools were gradually merged with the HBS in the 1920s, and vocational schools from 1919 were incorporated into a new law on vocational education. In both cases funding from the central government increased, marking the end of the period of relatively extended mu-

1 Slaman, Staat van de student, pp. 80-3.

nicipal control over post-elementary education. Without these locally initiated educational changes it may nevertheless have been much more difficult to adapt the schooling of adolescents to Dutch industrialisation.

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Chapter 2. From orphan to artisan: Dutch apprenticeship during and after the guilds

Abstract: Apprenticeships provided the main route towards skill formation until the advent of vocational schooling, but the institutional setting of apprenticeship is contested. Employing novel data of over 400 apprenticed orphaned boys from the Dutch cities of Leiden and Utrecht, this paper examines apprenticeship during and after the guilds. Mobility of apprentices was high and terms varied substantially, yet no complaints arose. Wages demonstrate that apprentices paid for training by providing labour already from the start, removing the need for contract enforcement. Dutch guilds limited the number of apprentices, forcing many Leiden boys to work as cheap labourers in the Leiden textile industry, which was free of guild control. Access to apprenticeships in the crafts significantly increased after the guilds were abolished. Records of private apprentices demonstrate that these apprenticeships were not fundamentally different from orphan apprenticeships. This suggests that Dutch guilds were not needed for apprenticeship to function, but hampered access to training.

Keywords: apprenticeship; craft guilds; contract enforcement; Netherlands

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Introduction

Before the advent of vocational schools on-the-job training was one of the main routes towards skill formation.[1] Craft skills were principally acquired through apprenticeships, whereby adolescents worked for craftsmen for a lengthy period in exchange for instruction in the craft.[2] It has been estimated that non-agricultural apprentices made up between 7.5 to 10 per cent of the English labour force in the eighteenth century.[3] As human capital formation is seen as a major determinant for economic growth, understanding how craftsmen obtained their skills is vital in explaining economic development and perhaps technological progress.[4] The degree to which youth had access to apprenticeships has also important consequences for social mobility, as it affected parents' decisions to invest in training.[5]

The institutional setting of preindustrial skill formation is contested. Epstein argued that contract enforcement provided by guilds was needed to overcome problems of mutual opportunism between master and apprentice.[6] Ogilvie claimed that apprenticeships were not needed for early modern skill formation because skills were relatively easy to learn, and that guilds merely acted as rent-seekers by using apprenticeships to restrict access to training.[7] Recent contributions have argued that high levels of apprentices' attrition suggest that apprenticeships were not enforced by guilds at all.[8]

Because of the private character of apprenticeships, and the possible biased nature of apprenticeship contracts and biographies, it remains difficult to assess what actually happened on the shop floor.[9] Although it has been established that attrition of seventeenth-century London apprentices was high, evidence on how training actually ensued during the apprenticeship, or apprenticeships, is still extremely limited.[10] Did masters indeed adjust the working and training distribution to mitigate the risk of early leave? There still is a large need for more empirical research to assess how guilds affected early modern

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, The gifts of Athena, pp. 259–60.
5 Klemp et al., 'Picking winners?'; Minns and Wallis, ' The price of human capital'.
6 Epstein, 'Craft guilds', pp. 688–93.
7 Ogilvie, 'Guilds, efficiency', pp. 302-14.
8 Wallis, 'Apprenticeship and training'; Minns and Wallis, 'Rules and reality'.
9 Mokyr, Enlightened economy, p. 118.
10 Wallis, 'Apprenticeship and training', p. 848.

skill formation. For instance, are worsted weaving apprenticeships on which Ogilvie based her argument representative for craft training? More case studies on apprenticeship when combined may also expose a broader pattern in early modern apprenticeship training.[1]

This paper uses novel data of apprenticed orphans in the Dutch cities of Leiden and Utrecht to test the effect of craft guilds on apprenticeship training. Dutch municipal orphanages kept detailed records of orphans apprenticed at local craftsfmen. Because of the prolonged existence of these institutions it is possible to compare apprenticeship training during and after the Dutch guilds existed, thereby singling out the effect of guilds on apprenticeships.[2] Data were collected on every apprenticeship taken by over 400 boys in the eighteenth and nineteenth centuries. These data permit to follow apprentices over different masters and crafts, and also reveal how their productivity advanced during the term. Supplementary records from guild archives indicate that orphan apprenticeships were alike private apprenticeships. Consequently, this is the closest we can get to examine the link between Dutch craft guilds and apprenticeship training.

Before discussing the data, section one will review the literature on guilds and contract enforcement. To see if textile apprenticeships are representative, section three compares skill formation in textiles to the crafts. Section four demonstrates that diverse terms and high mobility of craft apprenticeships was met by working and training in tandem, removing the need for contract enforcement. Section five argues that also private apprentices' productivity was from the start sufficient to pay for board and keep, mitigating enforcement issues for them too. Section six looks at the effects of guilds on apprenticeship training, and finds that guilds negatively affected access to craft apprenticeships. Section seven concludes.

Apprenticeship and contract enforcement

According to Epstein, contract enforcement by guilds ensured the success of early modern training.[3] Enforcement was essential because apprenticeships were thought to consist of two stages. In the first stage an apprentice received training from his master. To repay the master for training investment the ap-

1 Ogilvie, 'Rehabilitating the guilds', p. 181.
2 Davids, 'Apprenticeship and guild control', pp. 72-4, 78. Cf. Humphries, 'Rent seeking'.
3 Epstein, 'Craft guilds', pp. 688-93.

prentice needed to work for him for a specified period in the second stage of the apprenticeship. However, an apprentice had no incentive to reimburse training costs and could easily leave after stage one. This chance of default caused a master to refrain from training, using the apprentice as cheap labourer instead, consequently deterring adolescents from taking an apprenticeship. Consequently, without enforcement an apprentice is unsure whether he will be trained, and a master faces the risk of losing his training investment. Because guilds enforced both stages of the apprenticeship contract, Epstein argued, masters were ensured that apprentices would provide labour during the second stage so that training investments could be recouped, and apprentices were ensured to receive training.[1]

The enforcement argument has been repeatedly put forward to explain the success of preindustrial training, and as a reason for the prolonged persistence of craft guilds throughout early modern Europe.[2] Van Zanden suggested that the low European skill premium may have been caused because guilds ensured an efficient training system.[3] Humphries argued that apprenticeships enforced through guilds and other mechanisms contributed to the departure of English labour out of agriculture.[4] It is also stated that apprenticeships persisted in the nineteenth century precisely because the legacy of guild custom favoured training certification and contract enforcement.[5]

This reassessment of the role of craft guilds regarding apprenticeship has 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.[6] Second, high levels of apprentices' attrition suggest that guilds were unable or unwilling to enforce apprenticeships altogether.[7] Wallis proposed that early leave was not an issue because training and working occurred in tandem.[8] If apprentices from the start of the term worked in exchange for training, a master would not incur a large loss in case of early leave because training investments were recouped almost directly.[9]

1 Epstein, 'Craft guilds', pp. 691-2.
2 Pfister, 'Craft guilds', pp. 14, 18; Lucassen, De Moor, and Van Zanden, ' The return of the guilds'; Prak et al., Craft guilds.
3 Van Zanden, 'The skill premium', pp. 139–40.
4 Humphries, 'English apprenticeship', p. 99.
5 Elbaum, 'Why apprenticeship persisted'; Thelen, How institutions evolve.
6 Ogilvie, 'Rehabilitating the guilds', Ogilvie, 'Can we rehabilitate?'; Ogilvie, 'Guilds, efficiency'.
7 Minns and Wallis, 'Rules and reality'.
8 Wallis, 'Apprenticeship and training', pp. 845–6.
9 Wallis, 'Apprenticeship and training', pp. 846–7.

Although high levels of apprentices' attrition may indicate that the latter hypothesis could hold, it has been difficult to test these different theories.[1] As of yet there exists no data to examine if working and training indeed occurred in tandem, while the Württemberg worsted industry on which Ogilvie based her argument may not be representative for early modern skill formation.[2] It is also largely unknown what happened if apprentices left their master.[3] Through data on apprenticed orphans these debated characteristics of early modern apprenticeship can be assessed. These data will be discussed first.

Apprenticing Dutch orphans in Leiden and Utrecht

Dutch orphan apprenticeships were largely comparable to private or 'regular' apprenticeships. Both parents and orphanage regents tried to ensure a future in the craft for adolescent boys.[4] Municipal orphanages did so as to prevent downward social mobility. Admittance to these orphanages was generally restricted to children of late citizens (*poorters*), who often originated from the middle class of craftsmen. As McCants has demonstrated, the municipal orphanage of Amsterdam explicitly aimed at securing craft apprenticeships for male orphans.[5] Other Dutch orphanages also used apprenticeships to ensure that male orphans could become craftsmen like their late parents.[6] The municipal orphanages of Leiden and Utrecht were no exception.[7] Although the large textile industry of Leiden apprenticed orphans as well, its decline after about 1700 pushed the regents to also aim at craft apprenticeships.[8]

1 Ben-Amos, 'Failure to become freemen', p. 167; De Munck, Technologies, pp. 187-190; Sonenscher, Work and wages, pp. 109-11.
2 Epstein, 'Craft guilds in the pre-modern economy', pp. 168-71.
3 De Munck, Technologies, pp. 28-9, 45.
4 Van der Vlis, Weeshuizen in Nederland, pp. 32-33.
5 McCants, Civic charity, pp. 63-4.
6 Van der Vlis, Van wezen tot zijn, pp. 97-103; Groeneveld et al., Wezen en boefjes, pp. 62-3, 210; Wiel, Dit kint hiet Willem, p. 73. Higher classes often took care of orphans within their own circle; McCants, 'Poor consumers', p. 182.
7 Het Utrechts Archief (HUA), Archief Gereformeerd Burgerweeshuis, inv. 47-3, fol. 199r; Wiel, Dit kint hiet Willem, pp. 65–6, 73.
8 Wiel, Dit kint hiet Willem, p. 93. This earlier dominance of textile apprenticeships for Leiden orphans makes a comparison with seventeenth-century orphan apprenticeships probably unfeasible. On Leiden textile production see Posthumus, Geschiedenis, vol. II, p. 129, vol. III, p. 1099; Van Nederveen Meerkerk, De draad in eigen handen, p. 271.

Orphans received apprenticeship training alike private apprentices. Several orphans can be traced down as masters at an older age.[1] Individual notes also signal that training was provided. For example, Leiden master sculptor Krul 'at his expense' agreed to learn drawing to the orphan Cornelis Bavelaar in 1764.[2] Several apprenticeship lists of Dutch craft guilds confirm that orphans took part in the apprenticeship system in the same manner as private apprentices. All twelve Leiden orphans apprenticed at glass makers between 1754 and 1782 appear in the guild's apprenticeship list when the orphanage stated them to be apprenticed there, and they agreed to the same terms as private apprentices.[3] The Utrecht orphan Jan Dirk Bresser also appears in the apprentices' book of the Utrecht surgeon's guild when he was apprenticed there.[4]

In some ways orphan apprenticeships may have been different from private apprenticeships, but these differences are probably not sizeable. Orphans may have been apprenticed for shorter terms because they brought in higher wages after completing apprenticeships, which could be used by the orphanage.[5] Regents may also have invested less time in search because orphans needed to be placed somewhere to bring in wages. Orphan apprentices may therefore have moved masters more. However, moving crafts during apprenticeships led to lower wages, which was not in the interest of regents. It has, moreover, been demonstrated that also private apprentices moved masters.[6] Drop-out rates of around 21 to 28 per cent of orphans are slightly lower to those of private apprentices, presumably because their only exit-option was boarding a ship to the Indies or running away.[7]

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.[8] The time 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

1 Regionaal Archief Leiden (RAL), Archief Heilige Geest Weeshuis (HGW), inv. 3875 (incomplete).
2 RAL, HGW, inv. 3855, master Krul.
3 RAL, Archieven Gilden, inv. 524, book II.
4 HUA, Archieven, bewaard bij het stadsbestuur van Utrecht, behorend aan de stad (Archieven stadsbestuur), inv. 105.
5 Wiel, Dit kint hiet Willem, p. 46.
6 De Munck, 'Construction and reproduction', p. 101; Minns and Wallis, 'Rules and reality'.
7 Humphries, Childhood and child labour, p. 261; Sonenscher, Work and wages, pp. 109-11. I have given the lower bound estimates of Humphries because this treats uncertain cases as not completing, a method also employed here.
8 Wiel, Dit kint hiet Willem, pp. 66, 118; RAL, HGW, inv. 26.

century, demonstrating that many orphans continued to work as journeymen and sometimes even masters while being housed at the orphanage.[1] In both periods many 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 neither affected apprenticeship terms. In the eighteenth century most orphans arrived around the age of eight, but were not apprenticed until the age of fourteen. In the nineteenth century most orphans arrived around the age of twelve and usually were not apprenticed until they were fifteen.

Whereas for private orphans wages are scarce, apprenticed orphans did receive wages. The absence of private apprenticeship wages is probably explained because masters provided board and keep, and settled these costs with labour provided by the apprentice.[2] As a result it has been difficult to evaluate what apprentices' labour was actually worth during the term, thereby preventing to observe if working followed training. Orphans did not board but returned to the orphanage every evening. Because this removed the costs of board and keep, the margin between productivity minus training costs is reflected in wages paid by masters to orphans. These were partly used by the orphanage for board and keep, and were partly set aside as individual savings.

Orphans' wages very likely reflect productivity of apprenticed orphans, minus training costs. Apprenticing of orphans followed local demand, because they were 'rented out' annually. If wages were set too high no master would have showed up.[3] While close ties between masters and regents may have ensured orphan apprenticeships, masters easily let orphans go whenever regents pushed for high wages. For instance, stonemason Muts fired an orphan in 1773 because the regents demanded higher wages.[4] Wages were sometimes lowered to entice masters to apprentice an orphan. In 1763 the regents noted in their minutes that they had to accept lower starting wages in order to place apprentices at the crafts.[5] However, this only biases productivity estimates downwards. Wages received by other apprenticed orphans in Holland resemble those paid in Leiden, possibly because of the rigidity that characterized early modern Dutch wages.[6]

1 RAL, HGW, inv. 33, fol. 1r.
2 De Munck and Soly, ''Learning on the shop floor'', p. 21; De Kerf, De circulatie van technische kennis, p. 47.
3 RAL, HGW, inv. 33, fol. 30r.
4 RAL, HGW, inv. 34, fol. 121r-v.
5 RAL, HGW, inv. 34, fol. 2r.
6 Cf. Stadsarchief Amsterdam (SAA), Weeshuis en Oudemannen- en -Vrouwenhuis der Evangelisch-Lutherse Gemeente, inv. 99. On wage rigidity De Vries and Van

Others have also demonstrated that orphans' wages were primarily based skill level, especially for boys from the age of fourteen.[1] As will be demonstrated, wages dropped when switching crafts but not while moving within crafts, further signalling that skills drove wages.

By linking all consecutive apprenticeships of individual orphans, complete apprenticeship routes were reconstructed.[2] The Leiden and Utrecht data give weekly wages, name and craft of the master, and the term served in years, for every single apprenticeship.[3] These apprenticeships were manually linked to orphanage enrolment registers to obtain age of entry and exit at the orphanage, and the age at beginning and end of the apprenticeship route.[4] The data for Leiden covers a period during and after the Dutch guilds were in existence, namely 1754-1782 and 1829-1846. The Utrecht data is from the period 1778-1793. Enrolment registers state whether an apprenticeship route 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.[5]

Some apprenticeships may have started in a previous ledger thereby distorting the results. McCants identified a starting wage of twelve *stuivers* a week (one *stuiver* is 0.05 *guilder*) for orphans of the Amsterdam municipal orphanage at the beginning of their first apprenticeship. Starting wages of private Leiden glass makers' apprentices also did not exceed twelve *stuivers*.[6] A maximum weekly starting wage of twelve *stuivers* has therefore been used to identify the beginning of apprenticeship training.[7] Apprenticeships of orphans leaving the orphanage after 1782 and 1846 for Leiden, and 1793 for Utrecht are not included

der Woude, The first modern economy, p. 614.

1 Van Nederveen Meerkerk and Schmidt, 'Tussen arbeid en beroep', pp. 42, 45; McCants, Civic charity, pp. 80-81.

2 If an orphan appeared at another master before completing the years recorded at the previous master, the first agreement is considered terminated early. Controls in orphanage minutes, enrolment registers, and guild records confirm that this interpretation is correct.

3 RAL, HGW, inv. 3855, inv. 3862; HUA, Archief Gereformeerd Burgerweeshuis, inv. 769-2.

4 RAL, HGW , inv. 3390, inv. 3392; HUA, Archief Gereformeerd Burgerweeshuis, inv. 723-1. More than 94 per cent of apprenticed orphans were linked to the enrolment registers. Mismatching is unlikely because complete names are recorded in all sources and because the date of birth is known.

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

6 RAL, Archieven Gilden, inv. 524, book II.

7 This is confirmed by RAL, HGW, inv. 34, fol. 2r.

when considering completion, as they may have continued their training. After these corrections there are 141 full apprenticeship routes for Leiden during 1754-82, 223 for Leiden during 1829-46, and 65 for Utrecht. Whenever beginning and end do not affect the results, for instance when measuring levels of contract breach and distribution of apprenticeships, all agreements can be used, increasing the number of apprentices to over 700 in total, or more than 1,400 apprenticeship agreements.

The distribution of the first apprenticeships of eighteenth-century Leiden and Utrecht orphans can be seen in Table 2.1, grouped by HISCO minor groups.[1] The period 1763-1773 is listed separately for Leiden, because from this year onwards the regents decided to deliberately prefer craft apprenticeships over textile apprenticeships.[2] The table indeed shows that before 1763 most orphans started at textile apprenticeships (generally thread winding), and a more diversified picture afterwards, albeit with woodworking as most important sector. In Utrecht carpentry and woodworking were also the dominant craft apprenticeships.

Mirroring findings by McCants, apprenticeships in more common crafts dominated, presumably because access to high-end crafts was relatively restricted.[3] This should be considered an advantage because these apprenticeships are generally difficult to trace through other sources, while numerically they were more significant. Although a large share of Leiden orphans (47 per cent) started at textiles in the eighteenth century, many later moved to apprenticeships in crafts controlled by guilds. Most of these were apprenticeships in woodworking, such as cooping, and chair and cabinet making. Some orphans from Leiden and Utrecht did secure high-end apprenticeships, at for instance art painters, gold and silver smiths, and sculptors.

1 Van Leeuwen, Maas, and Miles, HISCO.
2 RAL, HGW, inv. 34, fol. 2r.
3 McCants, Civic charity, pp. 70-1.

Table 2.1: First apprenticeships of Leiden and Utrecht orphans.

HISCO minor group	Leiden		Utrecht
	1754-62	*1763-73*	*1778-93*
Spinners, weavers, knitters, dyers	60	7	1
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	0	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	0	0
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.

Apprenticeships at Leiden textiles

Using guild records from the Württemberg textile industry (worsted weaving), Ogilvie argued that early modern crafts in general required little skill, and hence that guilds were not needed to ensure skill formation.[1] However, seeing the relatively unskilled character of the textile industry, worsted apprenticeships may not be representative.[2] Apprenticeships of Leiden orphans allow to compare skill formation in textiles to that in the crafts, to see if there indeed was little difference in skill formation between both sectors.

Many decades ago Posthumus argued that apprenticeships in the Leiden textile industry leaned towards child labour instead of skill formation.[3] Re-

1 Ogilvie, 'Guilds, efficiency', pp. 302-14. Ogilvie, 'Rehabilitating the guilds', p. 177.
2 Cf. Van Nederveen Meerkerk, 'Market wage', p. 171.
3 Posthumus, Geschiedenis, vol. III, pp. 575-608. The wages found by Posthumus resemble those reported below. However, during the period he examined (1608-

cent work paints a more nuanced picture, as the type of child labour in Leiden depended on social class, age, and gender.[1] Especially from around the age of fourteen was unskilled textile work gradually being replaced by somewhat more skilled labour. This suggests that the orphans that are followed here were on the verge of making the move from unskilled child labour towards learning an actual craft. Nevertheless, Van Nederveen Meerkerk and Schmidt also concluded that most textile work performed by young boys and adolescents was relatively unskilled. Especially spinning could be learned in a couple of months.[2] Nearly all Leiden orphans placed at the textile industry were apprenticed at thread winding, which was a somewhat more elaborate type of spinning, but did not take a long time to master either.[3]

The mobility of apprenticed orphans suggests that textile apprenticeships were not favoured, because it depended heavily on whether they had started at textiles. Of all 67 Leiden orphans starting at textiles, more than half eventually moved to an apprenticeship in a guild-controlled craft, while moving the other way happened only twice. Perhaps the regents placed apprentices at textiles just to wait until an apprenticeship in the crafts was available. Moreover, the subsequent apprenticeship route for orphans moving from textiles to the crafts took the same amount of time as those beginning at the crafts immediately. Skills obtained at textiles were apparently of little use in the crafts. The second-rate position of textiles further shows in 1780, when the directors of the Leiden *lakenhal* asked the regents whether they would be keen to place girls as thread winders.[4] The regents answered to consider placing orphaned girls here only when all other options had failed.[5]

Because orphans' wages approximate skill levels during the apprenticeship, comparing wages between textiles and crafts demonstrates if more skills were picked up in craft apprenticeships. If skills between textiles and crafts were comparable pay scales should show a similar pattern. When orphans at textiles worked more than craft apprentices from the start because less training was needed, their starting wages may have been higher. Additionally, if craft ap-

43) twijnen was not a popular apprenticeship for orphaned boys (p. 584, Table 54). Posthumus did not reconstruct wage scales for individual orphans (p. 588), nor did he compare these to wages in guild-controlled crafts.

1 Van Nederveen Meerkerk and Schmidt, 'Tussen arbeid en beroep'; Van Nederveen Meerkerk and Schmidt, 'Between wage labor'.
2 Van Nederveen Meerkerk, De draad in eigen handen, p. 274.
3 Posthumus, Geschiedenis, vol. III, pp. 635-6.
4 Posthumus, Bronnen, vol. VI, pp. 255-7.
5 Posthumus, Bronnen, vol. VI, p. 257.

prentices received more training their wages should start out lower but increase faster, as they acquired more skills in the long run. Figure 2.1 gives the indexed average weekly wage of textile apprentices, and of apprentices who at some point moved from textiles to the crafts, relative to the average weekly wage of apprentices who stayed at one craft throughout their apprenticeships (set at 100 per cent).

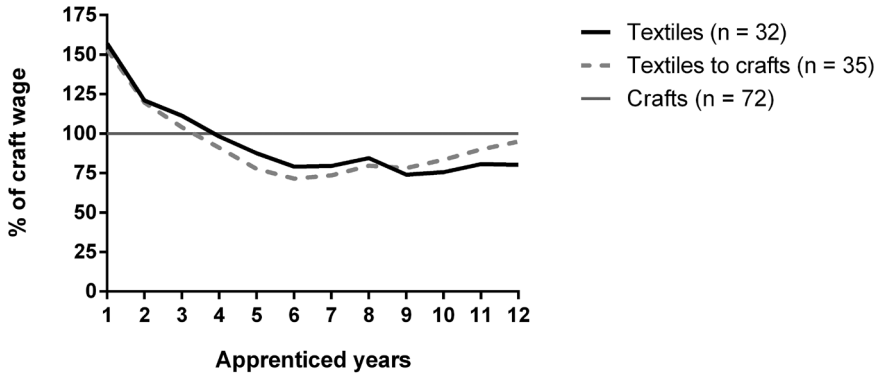


Figure 2.1: Average wages of textile apprentices relative to apprentices in the crafts (Leiden 1754-82).

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

High starting wages but relatively slow wage growth confirms the unskilled character of textile apprenticeships. Craft apprentices started out at lower wages, presumably because they had to acquire more skills before becoming productive. Craft apprentices had indeed acquired more skills by their fourth apprenticeship year and surpassed textile apprentices. From that point onwards craft apprentices structurally earned about twenty per cent more than textile apprentices.[1] This pattern persisted in nineteenth-century apprenticeships in Leiden. Also within the crafts wages appear to have been related to the amount of training required. Leiden orphans aged fourteen beginning their apprenticeship at carpentry earned about 7.6 *stuivers* a week, while their counterparts at silversmiths earned 6 *stuivers*. Utrecht orphans apprenticed at sculptors, painters, and printers also earned less than those at carpenters and coopers. This

1 A comparable wage differential is reported in Van Nederveen Meerkerk, 'Market wage', p. 174.

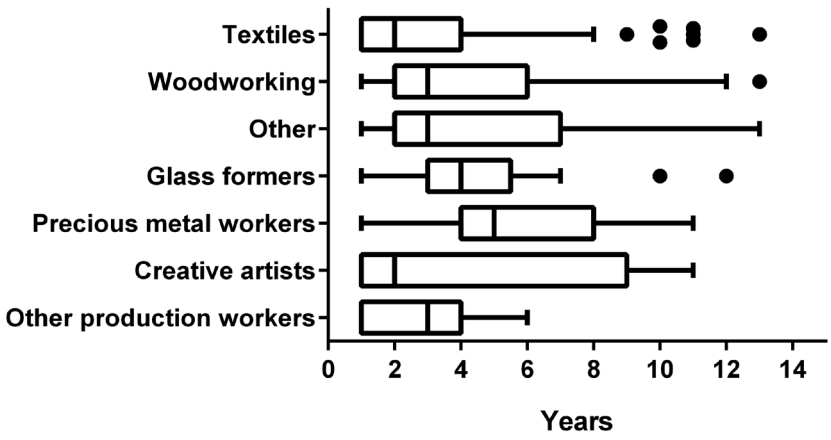
strongly suggests that more skills were acquired during craft apprenticeships than during textile apprenticeships, which had to be paid for by accepting a lower wage at the onset.

Orphans who moved from textiles to the crafts experienced a significant setback in wages, and had to be apprenticed for more than twelve years in total to reach the same level of skills. This is consistent with the finding that these orphans, after leaving textiles, needed to be apprenticed at the crafts for the same period as apprentices beginning in the crafts. Skills obtained in textiles were of no use in the crafts, and these orphans had to start from scratch. Apprenticeships at textiles should be seen as cheap labour, bringing in relatively high starting wages without securing a skilled future for orphans.[1] Apprenticeships at the Leiden and Württemberg textile industries are therefore not representative for craft training.

Craft apprenticeships and contract enforcement

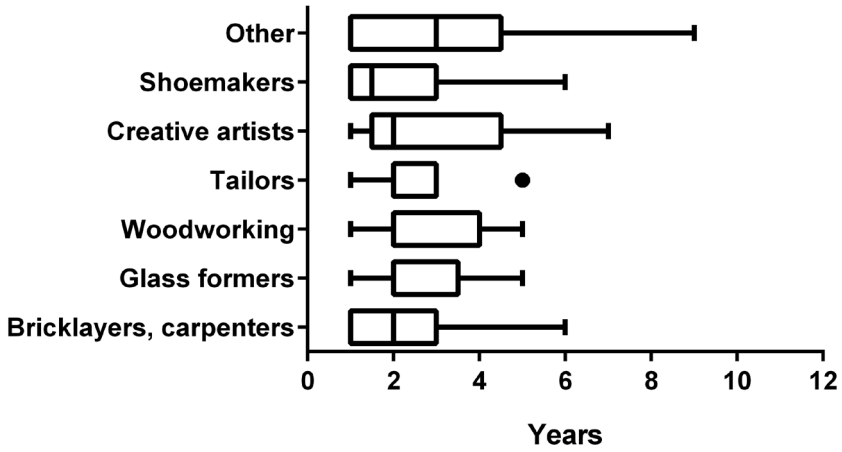
Although orphans in the crafts were clearly better off than their counterparts in textiles, they did not fulfil standardized apprenticeship terms, and even left their masters regularly. Terms served by orphans were highly diverse, as can be seen in Figure 2.2. Terms varied anywhere between one to twelve years within the same craft, and did not change much when only successful apprentices are considered. Moreover, no individual craft or master appears to have had standardized apprenticeship terms. As expected textile apprenticeships had short terms, but also apprentices at creative artists and other craft workers served short terms. For instance, Leiden master chair maker Graaff apprenticed four orphans between 1754 and 1769. These stayed for one, two, six, and thirteen years. Tanner Haar apprenticed one boy for three years, and another for ten years between 1767 and 1771. Even though the Utrecht orphanage appeared to do better in matching orphans to the right craft, Figure 2.2B demonstrates that this neither implied that terms were more uniform, nor that terms per master varied less. Even if only successful apprenticeships are considered, Utrecht master glass maker Eskes apprenticed boys for terms varying from one to four years. Carpenter Adams apprenticed Utrecht orphans for two, three, and six years.

1 Van Nederveen Meerkerk, De draad in eigen handen, p. 271; De Munck, Technologies, p. 192.



A. Leiden, 1754-82 (n = 311)

Figure 2.2: Distribution of all served apprenticeship terms per HISCO minor group.



B. Utrecht, 1779-93 (n = 118)

Notes: Boxplots give the distribution of terms. The vertical line within the box is the median term. The areas right and left of the median within the box represent 25 per cent of all observations, and every line on both sides of the box another 25 per cent. An absent line or a condensed boxplot means that the variation in terms is limited or skewed. For instance, half of all textile terms in 2.2A fall between one and two years. Dots are outliers.
Sources: see Table 2.1.

As can be seen in Figure 2.3, apprenticeships in Leiden and Utrecht were often not confined to one master. Moving masters was even not limited to orphans who dropped-out during their apprenticeship route. Of both groups about 65 per cent were apprenticed at more than one master. Changing apprenticeships was thus not solely given in by masters wanting to get rid of unwilling apprentices, but also happened for more talented apprentices. This all seems difficult to square with the enforcement theory. How were training investments recouped afterwards if terms were diverse, training was spread over several masters, and even talented orphans could apparently not be made to stay?

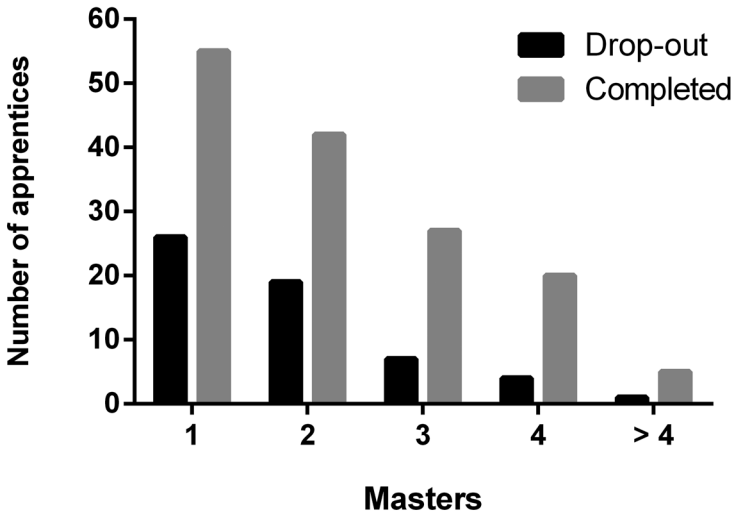


Figure 2.3: Number of masters of apprenticed orphans from Leiden (1754-82) and Utrecht (1778-93).

Notes: The distribution of masters per orphan did not significantly differ between Leiden and Utrecht; $x2\ (4, n = 206) = 5.849$, $p > 0.05$.
Sources: see Table 2.1.

Estimating contract breach signifies whether these diverse terms and high mobility resulted from variation in agreements, or because apprenticeship agreements were not enforced. Whenever a Leiden orphan started an apprenticeship his term was recorded. These years were sometimes agreed upon at the outset, but were also regularly annually prolonged. The former occurred certainly, since many orphans appeared before another master before their earlier terms had ended.

These 'missing years' can be interpreted as early leave, and allow to compute levels of contract breach. However, the large number of one-year contracts signals that rolling-over was common as well, preventing to measure early leave. Any differences between agreed terms in the ledger and actual terms served thus strongly underestimates the actual level of contract breach.

Figure 2.4 compares agreed apprenticeship terms for the crafts (excluding textiles) with actual terms served for Leiden orphans. For instance, there were 60 four-year contracts in the ledger, but 49 apprenticeships actually lasted four years. Some of these missing years are included under shorter-term contracts, which explains why there are more one and three-year terms than agreed to. Also several five-year agreements only lasted one or three years. The figure demonstrates that many contracts of four years and over were not upheld. Of all these contracts, 26 per cent were not served and had shorter terms instead. Even with many contracts being rolled-over, in total more than twenty per cent of agreed years were not served at all.

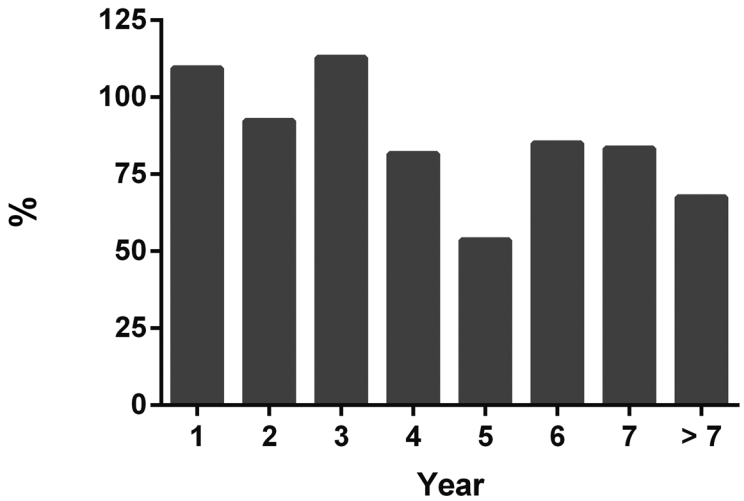


Figure 2.4: Share of craft contracts served, Leiden 1754-82.

Sources: see Figure 2.1.

Not only were contracts breached regularly, there was little demand for long-term contracts in general. Almost half of all agreed craft contracts had terms of three years and under. The large number of one-year contracts in the crafts also suggests that many masters in the crafts annually considered whether to extend

the apprenticeship. In Utrecht contracts were even always annually renegotiated. Every year Utrecht masters would state for how long they would hire the orphan, and only a couple of masters ever agreed to terms exceeding one year.

That contract breach was common for private apprentices too is suggested by the apprenticeship list of the Leiden glass makers guild and the Utrecht surgeon's guild. The former guild since 1658 allowed masters to have only one apprentice consecutively, and all apprentices had to be registered.[1] Of all 332 apprentices registered here between 1744 and 1790 more than 50 started before a previous apprentice finished his agreed term.[2] Several notes explicitly state that these apprentices had left early, or had switched masters.[3] Using the orphanage data as a control for actual served terms (as the orphans in glass making appear in this list), further suggests that these apprentices had quit early.[4] This indicates that these 52 contracts, or 16 per cent, represent early leave of private Leiden glass making apprentices. The apprenticeship list of the Utrecht surgeon's guild sometimes explicitly stated whether an apprentice had left early.[5] Excluding periods of possible under-recording because of a new dean, the list suggests that between 1740 and 1793 at least twelve per cent of apprentices left early. Both estimates, which should be considered lower-bound as well, approximate the share of contracts breached by apprenticed orphans.

With apprentices visiting multiple masters and staying for short and diverse terms, it must have been difficult to recoup training investments afterwards, perhaps causing masters to have refrained from training. While regents could have acted as third-party enforcers to ensure that orphans were still trained, the large variations terms and high levels of contract breach indicate that they were unable or unwilling to enforce apprenticeships. And why would masters themselves prefer short-term contracts if they could recoup training investments only in the long run? Consequently, either masters withheld training because

1 RAL, Archieven Gilden, inv. 515.
2 RAL, Archieven Gilden, inv. 524, book II.
3 Notes at apprentices Abraham Aarnoute; Karel Derwijn; Elias Leget; Jacobus van Rooyen; Johannes van Simonsbergen; Nicolaas Springer; Pieter Beitel; Adrianus Stephanus Longepe.
4 Orphan Rengelen stayed one year according to the orphanage register, while four years were agreed in the guild apprenticeship list. The orphanage register demonstrates that Johannes de Bruyn stayed for three years at master glass maker Du Pree, but the guild list gives a term of four years. After three years this master apprenticed a new boy. The same applies to private apprentice Abraham Aarnoute, who was to be apprenticed from 1765 to 1769. He quit during 1767 and was immediately succeeded by apprentice Casper Pittenaar.
5 HUA, Archieven stadsbestuur, inv. 105.

investments could not be recouped, or the training and working distribution was adapted to overcome these high levels of uncertainty.

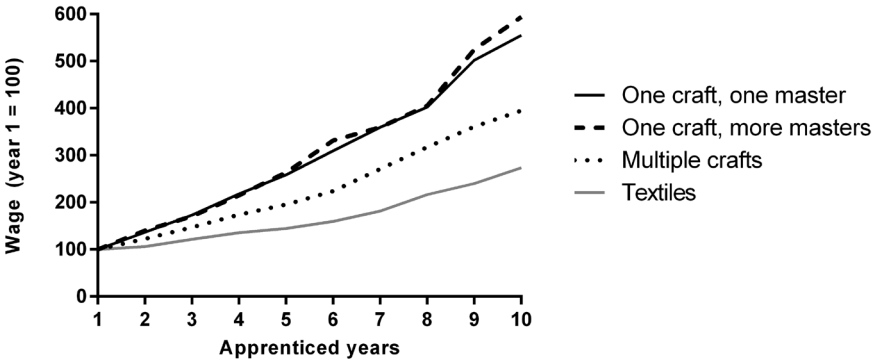
Since masters would not have paid more than the value of apprentices' productivity minus training costs, the point at which apprentices' labour exceeded training costs can be observed through orphans' wages. According to the enforcement theory, apprentices' labour would be valuable only after training was completed. A master would then pocket wages to reimburse himself for training costs incurred in stage one. Consequently, masters should not have paid wages in the first stage, and perhaps only a minor wage late during the apprenticeship when training costs had been fully recouped. Conversely, if masters balanced training and working throughout the term, apprentices would become more skilled with every year while also providing labour from the start. As the value of apprentices' labour would progressively increase through learning-by-doing, wages paid to the orphanage should have increased annually from the beginning of the term.

Figures 2.5A and 2.5B give the indexed average weekly apprenticeship wages for eighteenth-century Leiden and Utrecht orphans. Both graphs show that wages increased annually from the start, implying that productivity already exceeded training costs from the beginning. If apprentices were only valuable after training then no wages should have been paid during the first years at all, especially not for orphans, because they did not pay a premium to compensate for potential training investments at the beginning of the term. However, there was no single orphan who did not receive a wage during his first apprenticed year, or any year thereafter. This suggests that apprentices were from the start an asset to a master.

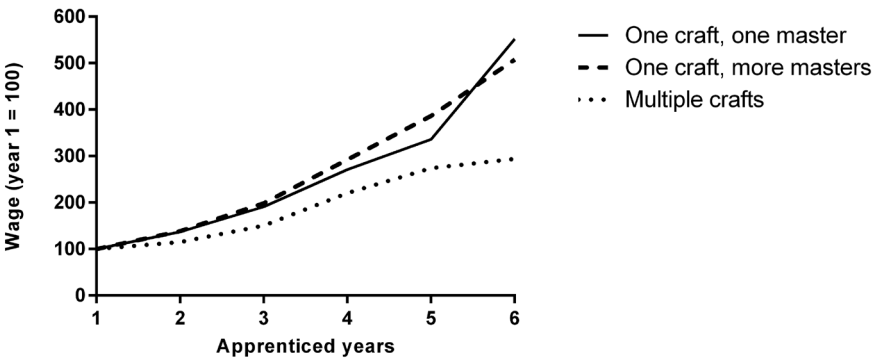
The starting wages and the subsequent wage development strongly support a system where working and training occurred in tandem from the beginning of the term. Large training investments during the first period alone would not have resulted in a sliding pay scale. This gradual increase in productivity of apprentices occurred very likely through learning-by-doing. Through learning-by-doing, supplemented by relatively unskilled chores, an apprentice would prove valuable to the master from the start, and apprentices would become gradually more skilled.[1] Increases in skill were indeed driving this wage development, as is demonstrated by lower average wages of orphans who were apprenticed at multiple crafts. When Leiden orphan Huybert de Jong switched from thread winding to map making in 1764, his wage dropped from twenty to eight *stuivers* since his obtained skills were of little use to his new master. It took De Jong another four years to reach his former wage level again. Switching masters

1 Wallis, 'Apprenticeship and training', pp. 846–7.

within the same craft more often than not led to higher wages. This implies that new masters within the same craft valued skills already obtained, and that moving within a craft occurred to become further specialised.



A. Leiden, 1754-82



B. Utrecht, 1779-93

Figure 2.5: Indexed average weekly wages of eighteenth-century apprenticed orphans.

Sources: see Table 2.1.

Wages did not flatten out at the end of the term presumably because the orphanage had to accept a wage cut to incentivize masters to take on orphans, just as private apprentices could pay a premium to gain access to crafts.[1] In 1763

1 Minns and Wallis, 'Price of human capital', pp. 348-9.

the regents explicitly stated that they had to accept a lower wage to ensure apprenticing their orphans.[1] Masters also may have had a stronger bargaining position in general since, as will be demonstrated, guilds limited the number of apprentices allowed. This wage cut may have been substantial, as the maximum weekly wage of 48 *stuivers* paid to Leiden orphans at the end of their apprenticeship represents about 35 per cent of a Leiden journeymen carpenter wage in this period.[2] Because of this margin wages could increase throughout the apprenticeship.[3]

By making an apprentice work from the start, training investments were recouped almost directly by labour provided by the apprentice. The distribution of training was thus adapted to the observed unenforceability and uncertainty of apprenticeship contracts. Because there was no investment to recoup ex post, high mobility and early leave was less of an issue. Masters and apprentices could at any point terminate the apprenticeship at relatively little costs.[4] A clear indication that masters indeed did not apply two stages can be seen in the apprenticeships of Johannes de Jong. He had been apprenticed at silversmith Sas for four years, but this master explicitly did not want to prolong the agreement in 1771.[5] Johannes had to find another silversmith to continue his training. At a new silversmith Johannes immediately received higher wages because of his acquired skills.

Under these conditions risk of opportunism by the master was solved by terminating the apprenticeship, making quitting itself a form of enforcing training. Apprentices could leave if training was underprovided or if the master or craft did not suit them. Also regents terminated apprenticeships when training was underprovided, when for instance they decided no longer to apprentice orphans at master cartwright Bronckhorst and master carpenter Noort.[6] At the same time this system allowed to let go apprentices relatively easily when they proved to be ill-suited, as was the case when Isaac Corse was fired by Leiden sil-

1 RAL, HGW, inv. 34, fol. 2v. The difference in starting wages between textiles and crafts persisted after 1763.
2 Pot, Arm Leiden, p. 303.
3 Productivity may also have continued to increase after the apprenticeship; Boot, 'How skilled', p. 285.
4 A comparable pay scale was used in nineteenth-century apprenticeships to mitigate problems of enforceability; Hamilton, 'The decline of apprenticeship', pp. 650-3.
5 RAL, HGW, inv. 34, fol. 202v [102v].
6 RAL, HGW, inv. 3855, notes at master Bronckhorst, master carpenter Noort. Also RAL, HGW, inv. 35, fol. 60r.

versmith Fortman.[1] Masters thus regularly breached apprenticeship contracts themselves.[2]

As little investment was lost, regents neither complained about the lack of enforcement, nor did they try to uphold contracts. During 1754-1782 only one of all 555 contracts was tried to be upheld by the Leiden regents. The case concerned an apprenticed thread winder who in 1766 had insulted his master.[3] After apologies the master, against the will of the regents, still refused to take back the orphan. Eventually, arbitration resulted in the master having to apprentice the boy again. Including this case, the orphanage minutes only contain two references to contract arbitration between 1744 and 1792. It is telling that both cases were instigated by regents demanding outstanding wages, and not by masters wanting to enforce apprenticeships. Resorting to arbitration to solve apprenticeship disputes was probably uncommon in general. Only seven out of 3,000 Leiden arbitration cases related to contract breach of apprentices in 1664.[4]

Guilds and masters were simply not preoccupied with trying to enforce apprenticeships. Even with many agreements ending abruptly and prematurely, masters never complained about losing their apprentices. Seeing the highly detailed orphanage minutes it is likely that the Leiden regents would have recorded conflicts with masters or guilds. Yet these cannot be found. 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.[5] All other masters did not see the need for such clauses and were either fine when their apprentices left after diverse periods, or sent them away on their own behalf. High levels contract breach and mobility did not pose a problem for the apprenticeship system because working and training occurred in tandem.

The lack of enforcement may even have resulted in better matching. Lesser talented orphans were quickly dismissed while more talented orphans stayed longer and primarily switched masters to improve skill formation. Of all Leiden orphans finishing an apprenticeship in the crafts successfully, almost seventy per cent visited more than one master, yet only 20 per cent was apprenticed in more than one craft. Conversely, orphans at the crafts who at some point drop-

1 RAL, HGW, inv. 3855, notes at master Fortman. Cf. RAL, HGW, inv. 34, fol. 196r [96r].
2 RAL, HGW, inv. 3855, master Linsel, chair maker, master carpenter Kerkhooven.
3 RAL, HGW, inv. 34, fol. 39v.
4 Van Meeteren, Op hoop van akkoord, pp. 269–70.
5 Masters Sanders and Smaze.

ped-out moved between crafts much more often. Of the 40 Leiden drop-outs, eighteen were apprenticed at more than one craft. It appears that the regents could only place these difficult orphans at other crafts or withdraw them from apprenticeship training altogether when their first apprenticeship did not work out. This interpretation is strengthened by the timing of their movement, as 61 per cent of them already moved during the first year. Of all successful apprentices only 29 per cent of moving masters or crafts occurred during the first year at a master.

Paying for board and keep

Apprenticing orphans appears to have followed the same pattern throughout the Dutch Republic.[1] Analysing over 2,500 apprenticeship contracts of Amsterdam orphans from the seventeenth and eighteenth century, McCants also found increasing pay scales while under the same master, and stagnating wages when changing crafts.[2] Although their mobility was lower, perhaps due to the lack of a large textile industry in Amsterdam, still at least 23 per cent of contracts were identifiable as second apprenticeships.[3]

Even more, the patterns found for orphans may not have been fundamentally different from that of private apprentices. Reith has demonstrated that many apprentices in the more common crafts in eighteenth-century Germany and Austria earned increasing wages from the start as well, since they too gradually helped in the production process from the beginning.[4] Several private apprentices in glass making in Leiden during 1744-90 also received wages from the start of their apprenticeship.[5] Although it cannot be inferred if these apprentices were boarding, their wage development was very identical to that of orphans apprenticed at glass making.[6] Private carpenters' apprentices in Amsterdam in the 1770s received wages too. It cannot be established how long these apprentices had been training, but they received wages around six *stuivers* a day, while their master earned 24 *stuivers* a day.[7] This wage differential is comparable to

1 Cf. Van Nederveen Meerkerk and Schmidt, 'Between wage labor', pp. 727–9.
2 McCants, Civic charity, pp. 70–74.
3 McCants, Civic charity, p. 70.
4 Reith, 'Apprentices'.
5 RAL, Archieven Gilden, inv. 524, book II.
6 Not all wage payments were listed; wages of apprenticed orphans do not appear on the list.
7 SAA, Archief van het Stadsfabriekambt en Stadswerken en Stadsgebouwen, inv.

that of the orphans. Incidental wages recorded by Noordegraaf of probable apprentices in carpentry also suggests that apprentices sometimes earned wages.[1] Eighteenth-century London shipwright apprentices also received annually increasing wages.[2]

It is, however, possible that orphan apprenticeships were dissimilar because orphans did not board, resulting in less of an investment for masters. If productivity of private apprentices did not cover the cost of board and keep then there was still an investment to be recouped, requiring a greater degree of contract enforcement. High mobility and early leave could therefore only be unproblematic for private apprentices if their productivity from the start covered the costs of board and keep. Although London tilers' apprentices earned wages high enough to provide for themselves, it is not clear if this was so already from the start.[3] Productivity of orphans should arguably be comparable to private apprentices, after controlling for differences in working hours. Their wages can as a result be compared to consumption costs to evaluate whether private apprentices' productivity could have been sufficient from the start to cover the costs of board and keep.

Fewer hours worked by orphans resulted in relatively lower productivity. Leiden guild bylaws do not give working hours of apprentices, but some contracts of Dutch painting, and gold- and silversmith apprentices do.[4] Two give workdays beginning at 6:00 A.M., another seven A.M. The working day ended at about seven or eight in the evening. One contract gives a workday of 6:00 A.M. to 8:00 P.M. during the summer and 7:00 A.M. to 7:00 P.M. in the winter. Another contract states that the apprentice was to work 'from the morning until the evening'. On Sundays orphans and private apprentices were off. Private apprentices then presumably worked twelve hours and six days a week, or 72 hours, which is probably a lower bound estimate considering some worked fourteen hours per day.

Apprenticed orphans worked less. The Lutheran orphanage of Amsterdam stated that orphans were to lunch at the orphanage at twelve o'clock. In Utrecht orphans were expected back at 11:30 A.M. for lunch and catechism, cutting at least one hour of their working day. In Leiden catechism removed two hours of

731. Based on a working week of six days; Noordegraaf, Daglonen, p. 34.

1 Noordegraaf, Daglonen, p. 23.

2 National Archives, London, ADM 106/ 2986, Shipwrights in Deptford 1734-84. I am obliged to Judy Stephenson for providing this data.

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

4 De Jager, 'Meester, leerjongen'.

the working week.[1] Amsterdam orphans were expected to return at 5:30 P.M. during the winter and at 6:00 P.M. in the summer during their first two apprenticeship years. In the municipal orphanage of Amsterdam working probably did no start before seven in the morning.[2] Orphans then presumably worked from 7:00 A.M. to about 5:30 P.M., minus at least one hour every day for lunch. This would leave a working week of approximately 57 hours: 21 per cent less than private apprentices.

With a median first-year weekly wage of 12 *stuivers* in Leiden, a private apprentice may have earned 15 *stuivers*. Around 1750 food costs per person were 2.45 *stuivers* a day, buying approximately 2,200 kcal.[3] Fifteen *stuivers* a week would then buy 1,924 kcal a day, which is just above subsistence. Orphans and private apprentices may nevertheless have earned more than the stated wages, as they generally received a tip of one fourth of their wage.[4] Increasing the first year wage by one-fourth would raise private apprentices' earnings to nineteen *stuivers* a week, enough to buy 2,400 kcal per day. Thus, private apprentices may well have covered the costs of consumption by their productivity from the beginning of their apprenticeship.

Because costs of board cannot be estimated, masters may still have lost a small investment when apprentices left at the beginning. It nevertheless seems unlikely that the costs of providing a mere bed and some clothes (if not already provided by his parents) would seriously alter these estimates. Moreover, paying a small premium could have compensated masters for this limited and temporary margin between productivity and costs of board and keep. While the orphanage may have been subsidizing training to a small degree in the first two years of the apprenticeship, this is not fundamentally different than premiums paid by parents to masters.[5] Furthermore, as argued it is likely that apprentices accepted a wage below productivity to gain access to training.[6]

Some contracts corroborate that productivity could indeed exceed the costs of board and keep, sometimes stating that apprentices paid for board and keep only by providing labour.[7] With wages of around three *guilders* a week, these gold and silversmith apprentices earned much more than any orphan during

1 RAL, HGW, inv. 34, fol. 14v.
2 McCants, Civic charity, pp. 38–9.
3 De Vries and Van der Woude, The first modern economy, p. 625.
4 RAL, HGW, inv. 3865, inv. 34, fol. 62v. Also mentioned in Reith, 'Apprentices', p. 189.
5 Minns and Wallis, 'The price of human capital', pp. 339-40.
6 Cf. Reith, 'Apprentices', pp. 189-90.
7 De Jager, 'Meester, leerjongen', pp. 77-9.

any stage of their apprenticeship, and more than enough to pay for consumption. Others earned a wage comparable to those of orphans even while boarding at their masters. Consequently, leaving masters at any time was not an issue for both orphans and private apprentices. By working and training in tandem masters never stood to lose much, as a result of which apprenticeships did not needed to be enforced.[1] This explains why both orphans and private apprentices at Leiden glass makers and Utrecht gold and silversmiths left in large numbers, and perhaps also why apprenticeships in early modern London and Antwerp were diverse.[2]

What about the guilds?

Although guilds did not enforce apprenticeships they still affected apprenticeship training. Some involvement may have been positive, such as certifying craft skills, but Ogilvie and Wallis argued that guilds primarily used apprenticeships to restrict access to the crafts by setting arbitrarily long terms, and by limiting the numbers of apprentices allowed.[3] Once again this can be examined for Leiden and Utrecht. The first critique in the case of Leiden does not seem to hold. All surviving guild by-laws set the minimum required apprenticeship term at only two years; well below most observed apprenticeship terms.[4]

All consulted Leiden and Utrecht guild by-laws did, nevertheless, limit the number of apprentices masters were allowed to have simultaneously. The regulations of the Leiden tailors guild ascribed that masters could only train one

1 It is likely that this system of working and training in tandem was less efficient than when apprenticeship contracts were enforced. With enforceable contracts unskilled work was not needed to mitigate early leave. Moreover, more training could then have been provided at the beginning so that a master could profit more from subsequent labour of the apprentice. While premiums could also have served to move the training forward in the apprenticeship, this would have required legal safeguards in the case a master refrained from training. It is unsure whether Dutch law courts mitigated in apprenticeship conflicts. For London see Minss and Wallis, 'The price of human capital'; Wallis, 'Labour, law and training'.

2 De Munck, 'Construction and reproduction'; Minns and Wallis, 'Rules and reality'.

3 De Munck, Technologies, pp. 80–4; Ogilvie, 'Guilds, Efficiency', pp. 307-10; Wallis, 'Apprenticeship and training', p. 852.

4 RAL, Archieven Gilden, inv. 5, inv. 63. These terms should be interpreted as minimum terms; Davids, 'Apprenticeship and guild control', 68.

apprentice at once.[1] In most other cases this limit was set at one or two apprentices. If these laws were upheld, orphanages and parents would have been severely restrained in apprenticing adolescents at guild-controlled crafts. Indeed, hardly any master apprenticed two orphans at the same time. Although masters such as chair maker Graaf, wicker furniture maker Maartense, cooper Taarling, and carpenter Munnick apprenticed multiple orphans, these were never trained simultaneously. The Utrecht carpenters guild limited the number of apprentices to one at a time.[2] Only one Utrecht carpenter breached these rules. All other about twenty carpenters also never apprenticed more than one orphan simultaneously.

Private apprentices were affected by these restrictions too. Masters from the Utrecht coopers guild were allowed only one apprentice simultaneously.[3] Their guild book from 1582-1664 confirms that these masters never had more than one apprentice at the same time.[4] The Utrecht gold and silversmith guild allowed two apprentices simultaneously for a term of three years.[5] Again, masters conceded to these rules. No single one of the 41 masters apprenticed more than two boys at the same time between 1730 and 1750.[6] It has already been demonstrated that no single Leiden glass maker master apprenticed more than one boy at the same time between 1744 and 1790, which was in line with their regulations as well. Moreover, in 1766 Leiden cloth shearers, who were one of the few textile crafts organized in a guild, complained that limitations on the number of apprentices per master prevented their trade to expand.[7]

Limited access to craft apprenticeships caused that textile apprenticeships were an exit-option in Leiden. Instead of guilds the Leiden textile industry was regulated by *neringen*, where the number of simultaneously allowed apprentices was either unregulated or set at high levels.[8] Unlike in the crafts, textile masters did apprentice multiple orphans. Thread winder Malesteijn at least three times apprenticed four orphans in one year. Thread winder Beijer apprenticed no less than eighteen orphans between 1754 and 1762 alone. Textile leash maker

1 RAL, Archieven Gilden, inv. 5.
2 HUA, Archieven stadsbestuur, inv. 79, fol. 15r.
3 HUA, Archieven stadsbestuur, inv. 123.
4 HUA, Archieven stadsbestuur, inv. 124.
5 HUA, Archieven stadsbestuur, inv. 126.
6 HUA, Archieven stadsbestuur, inv. 131-1.
7 Posthumus, Bronnen, vol. VI, p. 528.
8 Soly, 'The political economy', pp. 64–5; Posthumus, Geschiedenis, vol. III, pp. 355, 613, 701. Only one of six neringen regulations set a (relatively high) maximum of four apprentices; Posthumus, Bronnen, vol. V, pp. 301-2.

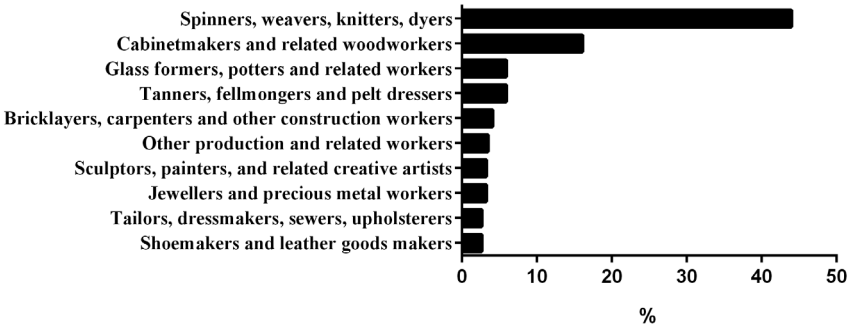
Vermeulen had at least five apprenticed orphans working for him in 1754. Absent apprentices' limitations in textiles probably explains why so many Leiden orphans started their apprenticeship here, moving to the crafts only when an apprenticeship there opened up.

Further signifying that guilds restricted access to apprenticeships is the 1763 decision by the Leiden regents to try to directly apprentice orphans at the crafts. They did so to ensure that their talents were put to best use.[1] However, reducing apprenticeships at textiles could not be compensated by crafts apprenticeships. A large share of orphans could no longer be apprenticed at all.[2] The average number of annually started apprenticeships declined from nine between 1754-62 to only 5.5 between 1763-82 (see Table 2.1). During the 1770s the male population of the orphanage was relatively high, so the average number of apprenticed orphans should arguably have been greater than before 1763.[3] It proved impossible to keep the number of annually apprenticed orphans at the same level because masters at the crafts simply could not take more apprentices due to guild by-laws. During 1829-45, when guilds no longer existed, the average number of new apprenticeships rose to thirteen annually even while the number of orphans had somewhat declined.[4]

Comparing the distribution of Leiden apprenticeship contracts before and after the abolition of the guilds further strongly suggests that guilds limited access. This can be seen in Figure 2.6, which gives all served apprenticeships per craft sector for Leiden orphans during and after the Dutch guilds. During the period 1754-1782 textiles apprenticed the bulk of all orphans. Only cabinetmakers apprenticed a large share of orphans as well. Figure 2.6B demonstrates that access to apprenticeships in previously guild-controlled crafts greatly increased once the guilds were abolished. The distribution of apprentices over different crafts became much more even, with the dominant sector of tailors conducting only twelve percent of all agreements.[5] Because the distribution of apprenticeships became so diverse not all minor groups could even be displayed. Instead of being predominantly apprenticed at textiles or woodworking, now the range of

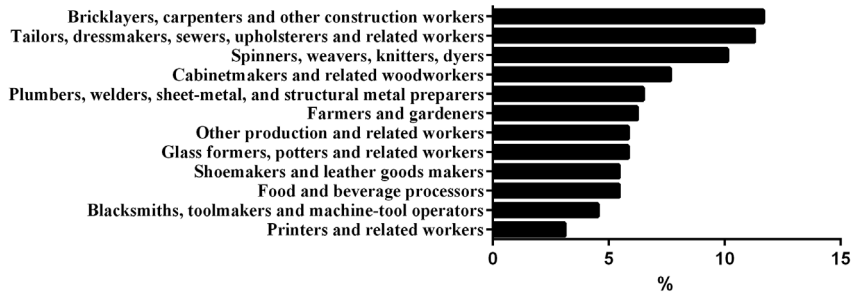
1 RAL, HGW, inv. 34, fol. 2r.
2 A large share of these orphans may have run away; Wiel, Dit kint hiet Willem, pp. 118-19.
3 Wiel, Dit kint hiet Willem, p. 117; RAL, HGW, inv. 3419, inv. 3426.
4 The share of apprenticed orphans on the total orphanage population was constant at around 24 per cent between 1830-57, suggesting that the male/female ratio and age distribution did not seriously affect the number of new apprenticeships annually; RAL, HGW, inv. 3876.
5 $x2$ (18, n = 1,064) = 330.59, $p < 0.0001$.

crafts was very diverse, with several orphans even being apprenticed at apothecaries and instrument makers. The three sectors that recruited most orphans each only drafted around ten per cent of all contracts, whereas between 1754-1781 textiles alone comprised more than half of all contracts alone. Now only nine per cent of apprenticeships were in textiles. A much larger share of these orphans actually finished these apprenticeships, suggesting that textiles was no longer considered an exit-option.



A. 1754-82 (n = 487)

Figure 2.6: Distribution of Leiden apprenticeship agreements over HISCO minor groups.



B. 1829-46 (n = 771)

Sources: RAL, HGW, inv. 3855, inv. 3862; inv. 3390, inv. 3392.

The abolition of the guilds also allowed employers at the crafts to apprentice multiple orphans simultaneously. Cooper Sliggers; paperer Labree; zilver smith Du Croix; gold smith Gonzaal; broom maker Platté; tinner Bosman; and painter and glass maker Zirkzee all trained more than one orphan simultaneous-

ly between 1829 and 1846. As guilds no longer controlled access to training the number of Leiden masters increased as well. During 1754-1782 the total number of craft masters hiring orphans did not exceed 90, but during 1829-1846 around 220 individual craftsmen appeared before the regents to apprentice an orphan. That the same restrictive apprenticeship patterns can be linked to guild by-laws for two different cities, and disappear after the guilds, strongly hints towards a link between access to training and guild control in the second half of the eighteenth century.

Some controls suggest that this increased distribution of apprenticeships for the largest part should be ascribed to the abolition of the guilds. As orphans were hardly apprenticed at textiles after 1763, it could be argued that the distribution of contracts should be comparable between 1763-1782 and 1829-1846. However, the distribution of contracts during 1829-1846 is significantly different from 1763-1782, and much more evenly distributed.[1] Moreover, the share of the Leiden workforce working in crafts even declined during the nineteenth century, and it was only after 1850 that the Leiden economy became more diversified.[2] Hence, if economic conditions were the main force driving these changes in apprenticeships we would expect either a lower share of orphans placed in craft apprenticeships, or a less diverse distribution.[3] When excluding textile contracts for both periods the difference in the distribution of contracts between the periods also remains statistically significant.[4]

The extensive change in the distribution of apprenticeships can neither be ascribed to laws or customs limiting orphans to work at textiles during the nineteenth century, nor to changing labour market characteristics. During the eighteenth and nineteenth century orphans at textiles and the crafts started around the same age, so the nineteenth-century decline in textile apprenticeships cannot be driven by a declining share of young orphans working at textiles moving the crafts afterwards, given in by for instance laws limiting child labour. A law prohibiting children aged twelve or under to work was only introduced in 1874, and before that children in Leiden continued to work in large numbers, not least in textiles.[5] Furthermore, a law limiting public funding of (semi-) confessional institutions, such as the Leiden orphanage, only came into being in 1854 and therefore does not affect the results.[6]

Consequently, the available evidence strongly suggests that increased access

1 $x2$ (7, n = 510) = 68.72, $p < 0.001$.
2 Pot, Arm Leiden, p. 57.
3 Pot, Arm Leiden, p. 64.
4 $x2$ (8, n = 644) = 102, $p < 0.001$.
5 Smit, 'Leidse kinderen'.
6 Wiel, Dit kint hiet Willem, p. 126.

to training should be ascribed to the abolition of the Dutch guilds. Only after the guilds were adolescents relatively free in choosing an apprenticeship of their liking or talent. For instance, twenty orphans quitting their first apprenticeship at a Leiden cabinetmaker during 1829-46 ended up in no less than twelve crafts. Such diversification had been unthinkable during the eighteenth century. The abolition of the guilds does not appear to have any other effect than to open up access to training. In Leiden average terms declined to 6.6 years, only because there was no longer a large group of orphans that had to wait at textiles before a craft apprenticeship opened up. Moreover, average wage development of apprenticed orphans at the crafts was alike in both centuries, suggesting that the abolishment of the guilds did not affect the quality of training.[1]

Conclusion

Detailed orphanage data allowed to test competing theories on early modern apprenticeship training. High mobility of apprentices and diverse terms demonstrate that apprenticeships were not enforced, yet apprenticeship still functioned. Gradual increasing wages confirm Wallis's suggestion that unenforceability was met by making apprentices work and train in tandem from the start of the term. Guilds, apprentices, and masters rarely complained about the lack of enforcement, simply because, contrary to Epstein's claim, there was no training investment to be recouped.

Comparing wages between the crafts and the textile industry showed that the latter cannot be taken as representative for early modern skill formation. At least in Leiden, orphans in the crafts learned more than their counterparts in textiles and received higher wages in the long run as a result. Ogilvie nonetheless was right by claiming that guilds limited access to apprenticeships. Both in Leiden and Utrecht orphans and private apprentices experienced reduced access to training, because masters adhered to by-laws limiting the number of apprentices. Many Leiden apprentices therefore had to begin training at textiles, where no guilds existed, only to leave this sector once an apprenticeship in a guild-controlled craft opened up. As in Württemberg, limiting access to apprenticeships may have been part of a wider policy of guilds aimed at excluding outsiders and upholding monopolies.[2]

After the guilds were abolished Leiden orphans had access to a much broader range of apprenticeships, while at the same time the number of masters increased. It is perceivable that this increased access to training fundamentally chan-

1 Paired Student's t-test, $t(58) = -0.147$, $p > 0.05$.

2 Panhuysen, 'Amsterdamse en Haarlemse kleermakersgilden'.

ged the Leiden craft sector, by for instance increasing competition and promoting specialisation. Earlier limitations on the number of apprentices could have obstructed an increasing division of labour, perhaps explaining why many early modern masters resorted to subcontracting with other masters to achieve this.[1] By making it easier to divide work over many workshops and many masters, the abolishment of the guilds may well have been conducive to nineteenth-century industrialisation.

More empirical research is needed to see if these results also apply to apprentices during other periods and regions. Guilds may have adapted the number of allowed apprentices to economic cycles, temporarily easing restrictions when demand for labour surged and vice versa.[2] Yet this only further indicates that guilds tried to control the labour market through apprenticeships. Moreover, available guild records demonstrate that orphan apprenticeships in Leiden and Utrecht were alike private apprenticeships. Private apprenticeship training in early modern England and Antwerp resembles orphan apprenticeships as well. The economics of early modern apprenticeship training could therefore indeed have been 'generally applicable across Europe'.[3]

1 Farr, 'On the shop floor', pp. 39–42.
2 Nusteling, Welvaart en werkgelegenheid, pp. 110, 150-2; De Munck, Technologies, p. 148.
3 Wallis, 'Apprenticeship and training', p. 854.

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Chapter 3. Schooling for certainty: on-the-job training and vocational schools during Dutch industrialisation, 1860-1920

Abstract: Formal education is argued to have been vital in spurring the second stage of the Industrial Revolution, but the importance of vocational training and apprenticeships for educating and selecting skilled workers has been disregarded. By taking the Netherlands as a case-study this paper examines how skilled industrial workers were ensured during the second stage of the Industrial Revolution. Novel data on Amsterdam adolescents first demonstrates that on-the-job training was highly insecure due to the absence of skill certification and a rising demand for unskilled workers. A growing division of labour made on-the-job training further impractical for employers. Second, data on occupations and educational attainment of more than 1,500 nineteen-year-olds shows that vocational schools permitted youths to bypass on-the-job training. Although vocational degrees did not result in higher wages, they did provide significantly better access to skilled occupations. A substantial decline of the skill premium around 1920 suggests that the combination of on-the-job training and vocational schools ensured sufficient skilled workers for the divergent labour market for industrial workers.

Keywords: skill formation; industrialisation; on-the-job training; vocational schools; Netherlands

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Introduction

The Industrial Revolution caused significant changes in the relative demand for skilled and unskilled workers throughout Western Europe. By now the established view is that, in general, the English Industrial Revolution did not need skilled workers.[1] Even more, due to a growing mechanization of production and an increasing division of labour, many tasks performed by workers seem to have required less skills than before. As Mokyr argued, 'the skills required for employment were less important than attitudes and behaviour'.[2] This caused a divergence in the labour market for manual workers, most of which now required very little skills to work at new machines. Consequently, both formal education and vocational training, such as apprenticeships, appear to have declined during the first stage of the Industrial Revolution.[3]

Formal education was nevertheless more important during the second stage of the Industrial Revolution, especially in countries that were catching-up. It has been demonstrated that elementary education was vital for Prussia to catch-up to England in the nineteenth century.[4] Here, industrial development depended on an educated populace that was aware of new technologies and capable of swiftly adjusting to changes in production techniques.[5] The same may have applied to nineteenth-century Sweden.[6] It has further been argued that in the United States there was no longer a trade-off between mechanization and demand for skills from the end of the nineteenth century, but that they became complements instead. Whereas during the first stage deskilling occurred, later on new technologies, such as batch production and the use of electricity, increased demand for educated workers to operate and maintain machines. As a result, there was a complimentary between technology and skill from at least 1909 onwards, but perhaps even earlier.[7]

While these studies have forcefully argued that formal education was important for industrial catch-up during the nineteenth century, the role of vocational schooling in this process has been overlooked. This is surprising, because it is difficult to believe that the specific skills needed to operate and service ma-

1 Mitch, 'The role of education; Sanderson, 'Literacy and social mobility'.
2 Mokyr, The enlightened economy, p. 121.
3 Snell, 'The apprenticeship system; Knox, 'Apprenticeship and de-skilling'.
4 Becker, Hornung, and Woessmann, 'Education and catch-up'.
5 Becker, Hornung, and Woessmann, 'Education and catch-up', p. 120.
6 Sandberg, 'The case of the impoverished sophisticate'.
7 Goldin and Katz, 'The origins of technology-skill complementarity', p. 724. Cf. Galor and Moav, 'Das human kapital'.

chines could have been exclusively taught in elementary schools.[1] It has been hypothesised that formal education may have been important during the second stage of industrialisation because it stimulated the formation of a disciplined and obedient manual workforce, and hence that the social function of elementary schools was perhaps more important than the actual skills taught.[2] However, if schools were merely to discipline workers this implies that especially for skilled workers other mechanisms of training would have been needed to supplement elementary schooling. But due to an increasing division of labour and labour mobility, on-the-job training may have become impractical for employers.[3] Yet even in the face of partial deskilling some amount of skilled workers was still required.[4]

This diverging labour market consequently presented industrial follower countries with an educational puzzle. Some countries may have solved it better than others. A declining apprenticeship system and underprovision of vocational schools has for instance been put forward as one of the reasons for the economic stagnation of England after the first stage of the Industrial Revolution.[5] Conversely, in Germany the new industries in collaboration with the government introduced an elaborate and well-coordinated apprenticeship system to provide skilled workers.[6] However, it remains unknown how other industrial follower countries rose to this challenge, and whether a regulated apprenticeship system provided the only solution to the training of skilled workers in industrialising Western Europe.[7]

By taking the Netherlands as a case-study, this paper examines how the provision of vocational training was adapted to this divergence in the labour market for manual workers during industrial catch-up, that took place between

1 Secondary schools did not significantly contribute to industrial catch-up in Prussia; Becker, Hornung, and Woessmann, 'Education and catch-up', p. 93.
2 Meyer, Ramirez, and Soysal, 'World expansion of mass education'; Bowles and Gintis, Schooling in capitalist America.
3 Knox, 'Apprenticeship and de-skilling'; Hamilton, 'The decline of apprenticeship'.
4 Mokyr, The gifts of Athena, pp. 141-2; De Jonge, De industrialisatie in Nederland, pp. 275-80.
5 Sanderson, The missing stratum; Green, 'Technical education and state formation'; Sanderson, Education and economic decline.
6 Thelen, How institutions evolve, chapter 2.
7 Goldin has argued that in the United States high schools provided skilled manual workers, but concedes that this is largely due to unique characteristics that did not apply to late nineteenth-century Europe, such as high levels of geographic mobility and great land availability; Goldin, 'The human-capital century', pp. 277-8.

approximately 1860 and 1920.[1] The Netherlands provides an interesting case because it was an industrial follower like Prussia, and witnessed an unparalleled growth of steam power use during the second half of the nineteenth century (Table 3.1). From the end of the century steam production was complemented by newer technologies such as electricity and gas.[2] Although elementary school enrolment rates in the Netherlands were comparable to Prussia, no formal apprenticeship system existed during this period.[3] Instead, vocational schools were founded from the 1860s to train adolescents for skilled manual work.[4] Did these vocational schools, perhaps in combination with on-the-job training, provide sufficient skilled workers?

Table 3.1: Steam power in hp per 1,000 inhabitants.

	1850	1870	1880	1896
United Kingdom	46.9	128.7	219.5	346.0
France	10.4	48.1	82.0	153.6
Germany	7.8	63.2	113.5	153.2
Belgium	15.8	69.2	111.0	183.2
Netherlands	3.3	36.0	61.8	122.6

Source: Van Zanden and Van Riel, Nederland 1780-1914, p. 290.

Skill formation of Dutch adolescents will be reconstructed by taking a micro-perspective. Using a variety of sources the paper tracks almost 2,000 adolescents to examine how on-the-job training and formal vocational schooling affected labour market access and earnings. Did vocational school pupils acquire better jobs and higher earnings, or were adolescents increasingly being stuck in blind-alley jobs, as was the case in nineteenth-century England?[5] To test if the provision of skilled workers may have been sufficient, wages of skilled manual workers will be compared to unskilled workers (the skill premium), and to vocational school enrolment levels.

The remainder of the paper is structured as follows. Section one uses orpha-

1 De Jonge, De industrialisatie in Nederland; Van Zanden and Van Riel, The strictures of inheritance.
2 Van Zanden and Van Riel, Nederland 1780-1914, pp. 377–87.
3 Knippenberg, Deelname aan het lager onderwijs; Anderson , 'The long road to collective skill formation'.
4 Wolthuis, Lower technical education in the Netherlands, p. 153.
5 Sanderson, The missing stratum, pp. 2–3.

nage registers from Amsterdam and Utrecht together with qualitative data from labour surveys to demonstrate that on-the-job training was insecure due to an increased demand for unskilled workers and the division of labour. Section two links conscription lists from Alkmaar and Breda to local vocational school registers, and shows that vocational schooling provided better access to skilled occupations compared to on-the-job training, but did not result in higher wages. Section three links the results to new estimates of the Dutch skill premium and argues that the combination of vocational schooling and on-the-job training provided sufficient skilled workers during this period of industrial catch-up.

On-the-job training and apprenticeships

With the abolishment of the Dutch guilds between 1815 and 1820 the only organisation controlling apprenticeships disappeared. It has been argued that guilds were not needed for apprenticeship to function in the sense that there was no two-stage model of training followed by working to pay for received instruction.[1] Instead apprentices paid for training by working from the start, probably at a wage below productivity. Apprentices will do this only when there is the prospect of recouping this investment through higher future wages or stable employment.[2] Although apprenticeships under the guilds were far from efficient, some features could have provided just enough incentives for adolescents to take, and pay for, an apprenticeship.

While masters under the guilds could, and did, use apprentices as a source of cheap labour, the payoff of an apprenticeship probably had been large enough for adolescents. Because guilds restricted access to skilled crafts to those who had completed an apprenticeship, apprenticed adolescents were relatively certain that completing an apprenticeship secured access to a protected labour market. Moreover, restrictions on the number of apprentices allowed per master were also beneficial for training because masters were assured that their provision of newly skilled workers would not seriously increase competition.[3] Furthermore, completing an apprenticeship and master test was often officially recorded, which enabled apprentices to demonstrate their skills to other employers.

1 Wallis, 'Apprenticeship and training'. See also chapter two of this thesis.
2 Thelen, How institutions evolve, p. 18.
3 Wallis, 'Apprenticeship and training', p. 852; Snell, 'The apprenticeship system in British history', p. 317.

Save for a small number of local initiatives from the end of the century, most notably in the sparsely populated region of Drenthe and the textile industries in the east, regulation and supervision of apprenticeships had by and large disappeared in the nineteenth century.[1] When Dutch industrialisation took off also the number of vocational daytime schools was very low, with less than ten around 1870.[2] There was a larger number of vocational evening schools, yet these did not provide vocational training but mainly provided classes in theoretical drawing.[3] Most skilled workers must therefore have been provided through another route. One route was to recruit skilled workers from abroad, and this certainly occurred in some industries. A Rotterdam workshop that specialised in the creosoting of wood - infusing wood with carbolineum under a vacuum to make it better preservable - had to hire Englishmen because workers in the Netherlands were still unfamiliar with the procedure.[4] However, hiring foreigners probably only occurred temporarily during the transition to new technologies.[5]

Skills could also be picked through firm-level apprenticeships. Existence of such apprenticeships is nevertheless relatively scarce. Only some larger firms such as electrical company Philips, machine factory Stork, and some railway companies seem to have provided formal firm-level apprenticeships around the end of the nineteenth century.[6] The lack of such apprenticeships can probably be explained by the still relatively small scale of most Dutch industrial and craft firms during this period. Even around 1909 more than half of the male industrial workforce (about 376,000 workers) was employed in industrial or craft firms with ten employers or less.[7] As late as 1928 only the metal industry knew an industry-wide apprenticeship system, where about 2,000 apprentices were trained.[8] By that time already more than 20,000 pupils attended daytime vocational schools.[9]

By default of these institutionalized methods of skill formation, on-the-job training was a significant training route for skilled manual workers until at least

1 Meppelink, Technisch vakonderwijs voor jongens, pp. 86-91.
2 Wolthuis, Lower technical education in the Netherlands, p. 97.
3 Boekholt and De Booy, Geschiedenis van de school, p. 201.
4 De Jonge, De industrialisatie in Nederland, p. 279.
5 De Jonge, De industrialisatie in Nederland, pp. 279-80.
6 De Groot, Fabricage van verschillen, chapter 10; Beets, Tachtig jaar Stork; Dehing, Eene soort van dynastie, pp. 49-52.
7 Figures from Gerwen and De Goey, Ondernemers in Nederland, pp. 34–5; De Jonge, De industrialisatie in Nederland, pp. 228–9.
8 De Ingenieur; T. Technische Economie, Nr. 49 (1928) [Bijlage], pp. 66-9.
9 Wolthuis, Lower technical education in the Netherlands, p. 188.

the 1920s.[1] On-the-job training allowed to pick up skills through learning-by-doing and perhaps through switching employers, without this being regulated in training agreements.[2] This could have made for a flexible training system, but it may have come at the price of insecurity for both worker and employer, as mutual obligations were not formalized. For example, historical accounts of nineteenth-century England are rife with statements of boys being used as cheap labourers without being trained, and also employers faced insecurities because workers could leave at any moment after having received training.[3]

Without contract enforcement this could have been resolved by working and training in tandem as happened during the guilds, but it is conceivable that on-the-job training in the Netherlands became more uncertain without guilds or unions regulating labour market access, and no training certification.[4] An increasing division of labour due to mechanisation could have affected on-the-job training as well, as it was no longer necessary for workers to be familiar with all the stages of production.[5] Was nineteenth-century Dutch on-the-job training as insecure as in England?

Reconstructing on-the-job skill formation is by nature difficult. Unlike England there are hardly any ego documents of skilled workers, and the small firms that dominated Dutch industry have left little sources. One of the few routes to capture and follow a substantial amount of adolescents during their first experiences on the manual labour market is through orphanages. Although this may seem an odd source at first, it must be borne in mind that Dutch orphanages aimed at securing a position in the crafts for their (male) orphans.[6] Ever since the early modern period orphanages were specifically designed for orphans from official citizens from the middle classes. Poor children in general did not have access to these institutions and were sent to poor or alms houses, while the elite often took care of orphans within their own circles.[7] Because late parents often originated from the craft, orphanages tried to educate male orphans for a future in the crafts as well. Most late fathers of Utrecht orphans in the period 1847-94 had indeed worked in the local craft industry, as for instance

1 Anderson, 'The long road to collective skill formation', p. 112.
2 Brown and Neumeier, 'Working class careers', p. 264; Thelen, How institutions evolve, p. 102.
3 Humphries, Childhood and child labour; Knox, British apprenticeship.
4 Cf. Hamilton, 'Enforcement in apprenticeship contracts'; Hamilton, 'The decline of apprenticeship'.
5 Goldin and Katz, 'The origins of technology-skill complementarity', 696–7.
6 Orphaned girls were generally trained as maids. See also chapter two of this thesis.
7 McCants, 'Poor consumers', p. 182.

carpenters, tailors, metal workers, or masons.[1] To secure a comparable occupation for its male orphans this orphanage, like most Dutch orphanages, placed them at local craftsmen so that they could learn on-the-job. Almost 75 per cent of all 149 Utrecht orphans apprenticed between 1865 and 1932 were therefore placed at local craftsmen.[2]

Although orphans may not be fully representative of youths being trained on-the-job, several features are not very different from adolescents still living at their parents. During their placements at employers orphans brought in wages just like other adolescents (although they may have been bargained down by employers). As wages were primarily awarded to the orphanage and partly as individual savings, both orphans and the orphanage had an interest in continuing on-the-job training. Like parents, the regents tried to make sure that orphans were able to provide for themselves when they had to leave the orphanage. This implied that the period of on-the-job training needed to be sufficiently successful. Otherwise the orphan would not achieve a wage level high enough to leave the orphanage, and the regents incurred extra costs for board and keep. The regents therefore had to aim for a stable period of on-the-job training so that sufficient skills could be learned, and avoid prolonged periods of training in crafts that did not suit the orphan, or did not lead to skill formation. Moreover, orphans in general did not have a lot of exit-options and may have been more motivated during on-the-job training. But just as there were stubborn adolescents the orphanages had to deal with stubborn and misbehaving orphans. After several warnings these were generally expelled from the orphanage, after which they had to fend for themselves.

Keeping these remarks in mind, orphanage data allows to follow quite a number of male adolescents during their period of on-the-job training. Data has been collected for the Reformed parish orphanage of Amsterdam (*Diaconieweeshuis der Hervormde Gemeente*) and the Reformed Utrecht orphanage (*Gereformeerd Burgerweeshuis*). For Amsterdam a register is available that lists on-the-job training of all orphans during the years 1887-1902.[3] The register gives the name of the employer; his craft; the orphans he employed; the period of employment; and the reason for termination of employment. As such it provides a very detailed look into on-the-job training of Dutch adolescents during industrialisation.

1 Het Utrechts Archief (HUA), Archief Gereformeerd Burgerweeshuis, list found at the back of inv. 723-2.
2 Meaning that they were placed at HISCO minorgroups 70 through 96; Van Leeuwen, Maas, and Miles, HISCO.
3 Stadsarchief Amsterdam (SAA), Archief Diaconieweeshuis der Hervormde Gemeente, inv. 1006.

The median age of starting and ending on-the-job training was fifteen and nineteen respectively. Jan Middel was for instance fired by painter Ten Brink in 1888 because of 'laziness', while in 1890 the regents removed him from a baker because Jan did not receive wages.[1] As the ledger stops in 1902, orphans not having finished their training before or during this year may have visited more employers later on. Until 1902 the ledger states when orphans left the orphanage, allowing to remove these uncompleted routes. A list of the occupations of orphans leaving the orphanage until 1900 is further used to identify the end of training.[2] In total on-the-job training of 327 Amsterdam orphans is known, composing over 1,400 placements at local employers.

The Utrecht data covers the period 1865-1932.[3] These lists do not give the reason for termination, but in contrast to Amsterdam the wages of orphans are known. Moreover, from the end of the century this orphanage started to enrol several orphans at the local vocational school, which allows to examine if these orphans were better off, in terms of wages and access to occupations, than those not attending vocational school. Because this orphanage was a lot smaller than the Amsterdam orphanage the number of observations is limited to 150. For that reason section two will add conscription data to further test if vocational school pupils fared better on the skilled manual labour market. But let us first examine how well on-the-job training in industrialising Amsterdam functioned.

From regulations and notes can be inferred that the placements of Amsterdam orphans at local crafts should be regarded as relatively informal on-the-job training. A decree from 1864 stated that the placements at craftsmen aimed at 'training them for a craft or position'.[4] Regents did remove orphans from employers when too little training was given. Orphans at times also left on their own behalf because training was underprovided. Employers vice versa fired orphans when they were not talented or capable enough, which suggests that they were not solely hired to perform only unskilled work.

Although this demonstrates an implicit understanding on both sides that at least some vocational training should be provided, this was not contractually formalized. During this period the orphanage appears to have formalized

1 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1006, fol. 112.
2 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 424. This source could be linked to the register because both give the full names of orphans and their date of birth.
3 HUA, Gereformeerd burgerweeshuis, inv. nos. 772-1 through 772-5.
4 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1055, decree of 1864.

a training agreement only once.[1] An earlier decree on the training of orphans (probably from the 1850s) had mentioned a trial period of three months, after which the orphan was no longer allowed to leave his boss so that 'he could learn his prospective craft as quickly as possible'.[2] For reasons unknown the renewed decree of 1864 no longer contained such a clause. Besides the regulation of a minimum wage for orphans and fixed working hours, neither party thus committed themselves to much more.

The total time spent on-the-job was more or less similar for all orphans since they started and ended around the same age, but the length of individual placements gives more insight into local training conditions. Was on-the-job training after the guilds indeed hampered by lack of regulation and certification, leading to credible commitment issues, as theory would predict?[3] Figure 3.1 gives the distribution of terms spent at each employer per craft. The figure captures about 70 per cent of all placements.

On-the-job training at the building industry (especially at carpentry) occurred most, followed by tailoring and forging. The figure shows that the majority of all placements had a very short term. More often than not the median term was as short as four to seven months within specific crafts. Only around twenty per cent of placements lasted longer than one year. Clerks were the only group that stayed longer in higher numbers, probably because demand for clerks strongly increased from the last quarter of the nineteenth century.[4] In the manual crafts, and in retail, on-the-job training was characterized by very short training periods. It is telling that 62 per cent of these placements fell between a couple of days to six months at most. With an overall median term of five months (and a mode of only three months), Amsterdam orphans clearly did not stay for long periods at every employer.

1 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 41, minutes of 12-8-1898.
2 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1055, handwritten draft (undated).
3 Becker, Human capital, p. 40; Smits and Stromback, The economics of the apprenticeship system, pp. 37, 40-1.
4 See chapter four of this thesis.

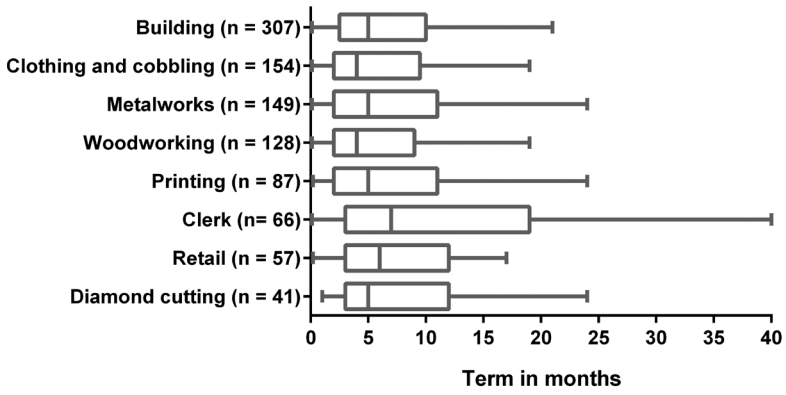
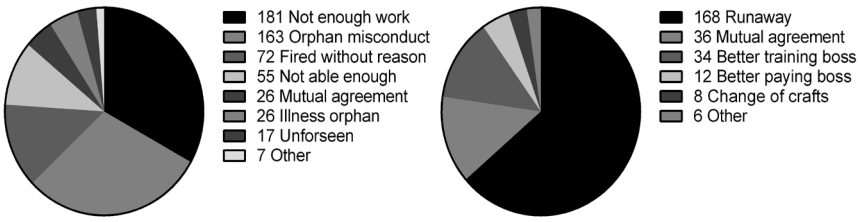


Figure 3.1: Distribution of terms per craft, 1887-1902.

Source: SAA, Archief Diaconieweeshuis der Hervormde Gemeente, inv. 1006.

A closer look at the reasons that were given for termination of demonstrates that these short terms were given in by insecurity for both employer and adolescent. These reasons reveal a training market where workers could lose their job at any moment and where bosses were continuously unsure whether their adolescent workers would return the next day. The reason for ending a placement are given in 886 cases.[1] In 61 per cent of the cases the boss took the initiative for ending the agreement, and 30 per cent of agreements ended on behalf of the orphan. The remaining nine per cent can be ascribed to the regents removing an orphan from his boss. Although this share varied from craft to craft, in general bosses in all crafts took the lead in ending placements. Orphans did run away from smiths in relatively large numbers, perhaps because the work was physically demanding.[2]

1 Orphans ending their training because they had to leave the orphanage have not been included.
2 Giele, De arbeidsenquête van 1887, vol. 1: Amsterdam, response no. 1334.



A. By bosses B. By orphans

Figure 3.2: Reasons for terminating on-the-job training of Amsterdam orphans.

Sources: see Figure 3.1.

Figure 3.2 breaks down the motives for ending a placement on behalf of the boss and the orphan, showing that employers fired at will when work was slow, and also that orphans ran away in large numbers. Ending on-the-job training with mutual agreement occurred only in eight per cent of all cases. Orphan Buckert, for instance, began on-the-job training at a carpenter in 1890. When he left the orphanage in 1895 he had visited no less than sixteen employers in carpentry. In every case Buckert was fired not because he was unwilling or misbehaving, but simply because the carpenter temporarily had not enough work. Although he was eventually capable of becoming a carpenter himself, this was despite and not because of this large number of employers.

Bosses also seem to have been unsatisfied by the conduct of many orphans, although it is difficult to establish if orphans were indeed troublemakers or if the boss was just looking for a reason to fire him. In some cases misconduct is obvious. Van Heusden, for instance, was fired in 1891 because he had stolen money from grocer Mulder.[1] Even missing a day's work because of illness was enough for some bosses to fire an orphan. Also bosses faced insecurity on behalf of the orphan. Orphans could, and did, leave at any moment. Securing better training or better pay was for instance a reason for orphans to quit termination, but mostly orphans simply did not return.

Because time spent at every employer was short and insecure, orphans had to visit multiple bosses to become skilled. The relatively well-behaving orphan Lansmig received no coppersmith training from his first two employers, and was fired from his fourth employer because he was ill. Because his skill formation as a result had been slow, the next brazier then fired him because he was not skilled enough. As can be seen in Figure 3.3 it was far from an exception to

1 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1006, fol. 33.

have several employers during the period of on-the-job training while living at the orphanage. Orphans who completed their on-the-job training route successfully even visited a comparable number of employers as orphans who dropped-out during training, suggesting that being fired did not occur exclusively because of misconduct.[1] Being talented or motivated thus did not lower the number of employers an orphan needed to visit to become skilled.

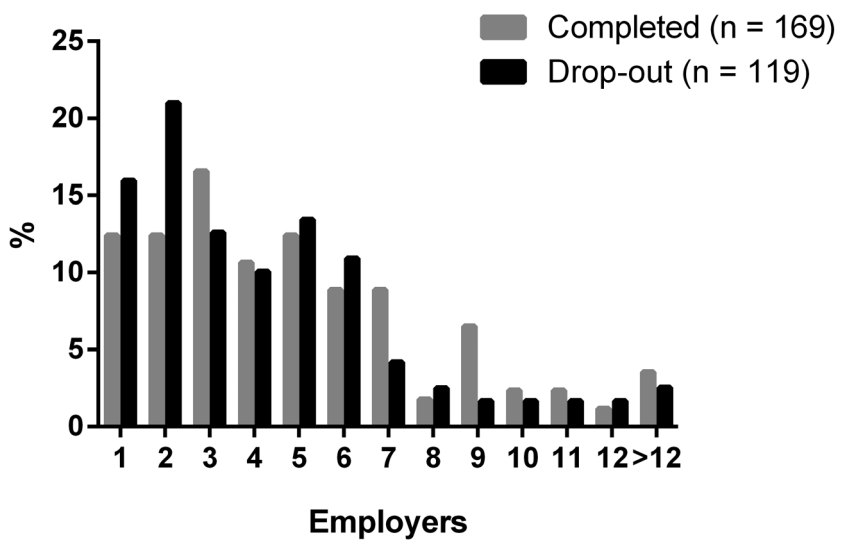


Figure 3.3: Number of employers during on-the-job training of Amsterdam orphans.

Sources: see Figure 3.1.

It is perhaps not difficult to infer why training on-the-job training in late nineteenth-century Amsterdam was characterized by short and insecure training terms. Turning again to the example of orphan Buckert at carpentry suggests why employers often fired adolescents at will. Both the large number of placements at carpentry and their short terms are given in by changing labour market conditions. Access to carpentry was easy but skill formation was uncertain due to irregular employment and standardisation of production. Competition in the housing industry from the 1870s led contractors to produce poor quality houses quickly (*revolutiebouw*). Contractors tried to lo-

1 $x2$ (12, n = 288) = 11.63, p = 0.476.

wer building costs by pressing suppliers of building materials to standardize production, leading to a division of labour where relatively unskilled work was being performed by adolescents.[1] Moreover, the industry was based on speculation, making it vulnerable to business cycles.[2] Production was therefore characterized by peaks and troughs, making employment in ancillary industries, such as carpentry, more insecure. Furthermore, because of specialisation of production skilled carpenters were being replaced by medium and low-skilled workers.[3] As a result, it was easier for bosses to replenish staff when work increased, leading to seasonal unemployment. Most orphans were indeed fired in the winter, when work was slow. All this explains why orphans completing their training within carpentry on average visited almost 7.5 bosses, but spent little time at other crafts.

This was not exclusive to orphans, or to carpentry alone. There are stories of other adolescents who failed to become skilled in carpentry or masonry because of these characteristics, and eventually had no choice but to enrol in the army.[4] Also in other industries in Amsterdam and in the Netherlands, such as tailoring, diamond cutting, and metal working, production was becoming increasingly unskilled. Relations between employer and employee became more uncertain due to new methods of production.[5] Jakob Keulen pursued a career as diamond cutter but insecure employment due to an increased supply of young diamond cutters rendered this difficult.[6] Between 1891 and 1893 he was fired eight times because bosses had no work for him. At leaving the orphanage he as well had little choice but to enlist for the army.[7] Similar stories can be told about other orphans as well.[8] As in the building industry the high mobility of orphans at tailoring can be explained by a combination of increased seasonal fluctuations in production and deskilling, which made employment and training insecure.[9]

Under these conditions both parties may have had little incentives to commit

1 Wals, Makers en stakers, pp. 27-8.
2 Knotter, Economische transformatie, pp. 95–7.
3 Knotter, Economische transformatie, p. 105; Van der Woud, Koninkrijk vol sloppen, p. 50.
4 Giele, Arbeidersleven in Nederland 1850-1914, p. 72.
5 Van Zanden and Van Riel, Nederland 1780-1914, pp. 305–6.
6 Knotter, Economische transformatie, pp. 82–5.
7 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1006, fol. 123
8 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1006, fols. 112, 59, 144, 139, 185.
9 Knotter, Economische transformatie, pp. 149–51; Visser, Dicke, and Van der Zouwen (eds.), Nederlandse ondernemers 1850-1950, vol. 3, p. 128.

to long-term training agreements. Adolescents were not inclined to take a wage cut to pay for training, or perform menial tasks for a prolonged period, when the payoff was far from certain and when skill certification was absent.[1] With access to the crafts no longer restricted, craftsmen may have withheld training in order to limit future competition, using them as cheap labourers instead.[2] For instance, many medium and low-skilled carpenters were recruited from outside Amsterdam.[3] This in turn further reduced the payoff for adolescents, explaining why they ran away in such large numbers.

Most importantly, because demand for skilled workers was limited employers simply did not need to provide training to all their young workers. Many tasks in the workshops could presumably be performed by unskilled adolescents, and only some skilled workers were needed. As a result employers could easily let adolescents go in periods of little work or when they simply did not like the orphan. In such a training market it could be expected that only a share of young workers eventually became skilled, and that employers would only provide (some) training to those who were motivated and talented enough. Moreover, only the motivated may have had sufficient perseverance to endure insecure on-the-job training over many employers. The lesser talented or motivated presumably never made it to this level and were filtered out along the process of on-the-job training, and joined the growing ranks of the unskilled labour force.

Whether such a selection process existed for the Amsterdam orphans is nevertheless difficult to quantify. As indicated there was no difference in the number of employers visited between orphans who dropped out and orphans who secured a position in the crafts. Also the number of different crafts visited did not significantly differ between the two groups.[4] However, this is because dropouts often quit on-the-job training while at their first two crafts, whereas successful orphans stayed for longer periods at one craft. Orphans who dropped out on first sight did have a shorter period of on-the-job training than successful orphans. However, it remains unclear if these orphans were indeed lesser talented, or misbehaved more often, or if they were filtered out arbitrarily.

Because wages of Amsterdam orphans are unknown, another variable is required to proxy motivation or talent. Since the reason for termination is

1 Cf. Thelen, How institutions evolve, pp. 101–4.
2 In nineteenth-century Germany bosses in the crafts provided training not only because of regulation but also because many apprentices left the handicraft sector afterwards to work in industry; Thelen, How institutions evolve, pp. 54–5.
3 Knotter, Economische transformatie, p. 105.
4 $x2$ (4, n = 288) = 1.11, p = 0.892.

known, a 'misconduct score' can be calculated for every orphan. This score is obtained by counting how often every orphan was fired because of reasons relating to misconduct, divided by his number of employers. The precise wordings identified as misconduct can be seen in Appendix A, and are for instance being too late, impudent, stubborn, or lazy. The higher the score, the more difficult an orphan was. Although this may be an imperfect measure, it does capture to some degree how motivated an orphan was to become skilled.

To test if relatively misconducting orphans were deliberately filtered out along the training process, four regressions have been run. The first regression tests which variables affected successful completion of on-the-job training (coded as 1). As can be seen in Table 3.2, a high misconduct score strongly and significantly lowered the probability of successful completion. The level of misconduct in fact stands out as the most important variable explaining completion of on-the-job training. Difficult orphans were on average twice as likely to drop-out. This corresponds with Figure 3.2A, which showed that many bosses fired orphans because of misconduct. Apparently employers selected the best orphans, with misconducting orphans dropping out.

However, many orphans were also fired without notice because work was slow, and Figure 3.3 suggested that the number of employers was also high for orphans who did complete on-the-job training successfully. This also shows in Table 3.2, since the number of employers and crafts did not significantly affect the likelihood of completing on-the-job training. Also motivated orphans needed to visit more employers and crafts to become skilled. Because this prolonged the training period, the longer an orphan was able to remain in training the higher the chance of completion.

Regressions 2, 3, and 4 confirm the results of regression 1 using different dependent variables. Regression 2 demonstrates that misconducting orphans dropped-out significantly earlier (about fifteen months) and that more employers increased the training period. The most interesting finding for regressions 3 and 4 is that neither the number of employers nor the number of crafts was significantly affected by the misconduct score, thereby once more demonstrating that also motivated orphans had to visit multiple bosses and crafts because employment was unsure for all orphans. Moreover, a regression on the average term per master shows that individual terms per employer were also unaffected by the misconduct score (Appendix Table A3.1). Thus, the two main findings are that relatively unmotivated orphans were indeed filtered-out along the training process, but that even motivated orphans needed to visit multiple bosses to become skilled. As also suggested by Figure 3.1 and 3.2, this was because employment was short and insecure, even for motivated orphans.

Table 3.2: Explaining on-the-job training completion, duration, and mobility.

	Dependent variable			
	(1)	(2)	(3)	(4)
	Completed	Total length[1]	No. of employers	No. of crafts
Starting age	1.210 (6.25)***	-6.458 (-10.60)***	-0.238 (-2.64)**	0.011 (0.27)
No. employers	0.066 (1.47)	1.564 (4.11)***	-	0.160 (4.39)***
No. crafts	-0.354 (-1.45)	-1.264 (-1.23)	1.318 (8.08)***	-
Misconduct score	-2.076 (-2.48)**	-15.037 (-3.02)***	1.369 (1.53)	0.273 (1.34)
Total length[1]	0.148 (5.47)***	-	0.041 (3.49)***	-0.004 (-1.30)
Constant	-23.388 (-6.57)***	137.309 (12.15)***	4.722 (1.53)**	0.922 (1.10)
R^2	0.509	0.354	0.337	0.235
N	242	242	242	242

[1] Total length of on-the-job training track while at the orphanage, in months.
Notes: Regression 1: binary logistic regression with z-scores in parentheses and pseudo R^2. Regressions 2, 3, and 4: linear regression with t-scores in parentheses. All standard errors are clustered by starting year of on-the-job training. Coefficients marked *, **, and *** are significant at the 10%, 5%, and 1% level.
Sources: see Figure 3.1.

From these figures alone it is yet difficult to tell if this informal training market met employers' demands for skilled workers. Some wage data does suggest that those who trained until around the age of nineteen were as skilled as they had been a century before, during the guilds. Around 1913 the average nineteen-year-old orphan earned about 26 per cent of a skilled workers' wage.[1] In the eighteenth century apprenticed orphans from Leiden had earned about one third of a skilled wage when leaving the orphanage, but with an average departure age of 24 they were considerably older.[2] In terms of training efficiency this suggests that not much had changed for those who managed to complete their period of on-the-job training.

Although training may have been provided in a comparable manner as before, employers now selected only the most perseverant orphans for training.

1 The average wage of nineteen-year-old orphans around 1913 was 5.84 guilders a week, and a skilled manual worker from Amsterdam earned about 22,5 guilders a week; SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1094; Verslag Onderwijs (1913), p. 300.
2 See chapter two of this thesis.

As a result, the remainder experienced severe difficulties to become skilled and earn higher wages. Out of 288 orphans only 59 per cent successfully completed their period of on-the-job training. In comparison, before industrialisation, completion rates of apprenticed Dutch orphans had been around 75 per cent.[1] Moreover, 17 per cent of the successful Amsterdam orphans even now did not secure a position as a skilled manual worker but ended up in blind-alley jobs such as shop assistant or warehouse porter. At least 30 per cent of boys appearing in the ledger ended up in blind-alley jobs or enrolled in the army.[2] Even after orphan Meij had visited no less than fifteen bosses at tailoring he was still not able enough to provide for himself at leaving the orphanage, making him to join the army.[3] Because skill formation was more difficult several orphans proved unable to leave the orphanage. In December 1897 some orphans complained at the regents that their earnings were too low to provide for themselves. The regents decided that in the future not only age but also weekly earnings should be considered when deciding to discharge orphans.[4] Apparently on-the-job training resulted in too little skill formation, and hence in low wages.

There is no quantitative data of non-orphans to compare these findings with, but labour surveys conducted by a committee installed by the central government in 1887 and 1890 do provide qualitative statements about on-the-job training of Dutch youth. These demonstrate that also adolescents outside the Amsterdam orphanage faced uncertain training conditions and had difficulties becoming skilled, because of a division of labour and increased demand for unskilled workers. Examples of job-hopping and informal learning appear throughout the reports.

A pressman from Rotterdam had learned his craft 'by imitating other workers'.[5] In a Rotterdam iron foundry boys learned the trade by imitating older workers as well and by gradually moving towards more complicated tasks.[6] An Amsterdam painter stated that boys wander around the labour market for so-

1 See chapter two of this thesis.
2 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 424. This is an underestimate since we do not know what happened to orphans who ran away.
3 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1006, fol. 140.
4 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1006, minutes of 16-12-1897.
5 Arbeidsenquete 1890: Derde afdeeling: bedrijven in onderscheiden gemeenten, response no. 6716.
6 Arbeidsenquete 1890: Derde afdeeling: bedrijven in onderscheiden gemeenten, response nos. 7116-7.

me years 'picking up trades here and there'. When they wanted to further train themselves this was done by visiting one boss after the other, just as the orphans did.[1] In the case of printers another commenter was more negative. He replied that in the past apprentices and masters had mutual responsibilities, but that at present boys move from one boss to the other, with relations between the two being characterized by indifference. As a result 'no boss had an interest in teaching boys anything'.[2] Training also required too much effort for bosses.[3] An Amsterdam blacksmith confirmed that there was little opportunity for workers to learn a craft on the work floor.[4]

Mirroring the informal training of orphans, the committee only came across one formal apprenticeship system. This concerned a type-foundry in Arnhem, where boys were trained for six years by being placed at different lines of production. The apprentice paid for training by taking a wage cut and by paying a premium. After the training period he was ensured a position as journeymen with full pay. Like the Rotterdam workshop that specialised in the creosoting of wood, these apprenticeships had probably been put in place because skilled typefounders were still rare. Both parties consequently had an incentive to fulfil the term, but mutual commitment was also contractually enforced.[5] According to the committee such a training system was found nowhere else in the Netherlands.[6] When the interviewed worker had moved to Amsterdam he had indeed experienced that such apprenticeships were not at all common. Although some Dutch pottery factories did have some sort of apprenticeship system, the training period was characterized by performing unskilled work without good prospects. Many boys therefore quit prematurely.[7]

The reports also signal that training could be hampered by credit constraints. The director of a copper foundry from The Hague had considered introducing apprenticeship contracts. He had abandoned the idea because many boys, and their parents, would not be able to afford the wage cut to pay for training.[8] The director understandably did not want to pay for training

1 Giele, De arbeidsenquête van 1887, vol. 1, response no. 3263.
2 Giele, De arbeidsenquête van 1887, vol. 1, response no. 3888.
3 Arbeidsenquete 1890: Derde Afdeeling: Leiden, response no. 5467.
4 Giele, De arbeidsenquête van 1887, vol. 1, response no. 1334
5 Giele, De arbeidsenquête van 1887, vol. 1, response no. 4134.
6 Giele, De arbeidsenquête van 1887, vol. 1, response no. 4131. Cf. Trampusch, 'Co-evolution of skills', p. 208.
7 De Groot, Fabricage van verschillen, pp. 277, 453–4.
8 Arbeidsenquete 1890: Derde afdeeling: bedrijven in onderscheiden gemeenten, response no. 6900.

himself because other firms at any time could poach these workers. Cooper Kleinze from Rotterdam had experienced this. Many of his coopers directly after training left to work at better paying shipping companies.[1] A fourteen year old candle maker from Gouda did not want to be trained in carpentry because then his current wage of two *guilders* a week would fall to only 25 cents - a setback he could not afford.[2]

Data from the Utrecht orphanage demonstrates that sometimes measures were taken to reduce the uncertainty in skill formation. Access to this orphanage was restricted to children of Utrecht citizens of at least ten year with a 'respectable profession'.[3] This caused the population of the orphanage to be much smaller than in Amsterdam. Between 1880 and 1900 the number of orphans was about 65 on average. These strict conditions may have ensured that the regents were able to put in more effort trying to secure more stable training. The terms of training placements of Utrecht orphans were much longer than in Amsterdam, even though they were placed at the same type of crafts. Here too carpentry was most popular. In their five-year training period, orphans from Utrecht visited just over two bosses on average, even those who were placed at carpentry or tailoring.

These relatively stable placements were the result of the regents trying to promote commitment of local employers. The minutes of the orphanage display more concern with the training and education of orphans than in Amsterdam. A central feature was that the orphanage regularly paid a premium to employers. In 1908 the regents paid one *guilder* a week to a smith in Velp to train orphan Ruijter. Although part of this premium was a compensation for board and keep, it was also intended as an incentive to provide proper training. The smith explicitly told the regents that he would most likely fire the orphan if the premium was discontinued.[4] Most of these premiums were small at around two to three guilders a week, but this may have exceeded costs of board and keep, which can be estimated at around 1,50 a week.[5] On an annual basis this margin could accrue to a considerable sum. Next to providing cheap labour these orphans thus brought in some extra money for employers. In 1897 the regents even paid a premium of 100 *guilders* to watchmaker Henri,

1 Arbeidsenquete 1890: Derde afdeeling: bedrijven in onderscheiden gemeenten, response no. 4026
2 Arbeidsenquete 1890: Derde afdeeling: bedrijven in onderscheiden gemeenten, response no. 5908
3 HUA, Gereformeerd burgerweeshuis, inv. 718.
4 HUA, Gereformeerd burgerweeshuis, inv. 47-18, p. 2586.
5 Brugmans, De arbeidende klasse, pp. 160–1.

which suggests that without apprenticeship regulation quality training was really at a premium.[1] Another measure of the regents to promote training was to exempt employers from paying a wage during the first years of training. Of all 102 orphans who started with a boss between 1865 and 1932 without going to the vocational school first, eighteen per cent did not receive wages during their first year.

Although these measures sometimes were effective, on-the-job training in Utrecht suffered from some of the same insecurities as in Amsterdam. Employers still had little reason to provide quality training, and even if training was provided orphans were unsure if it would pay off. Neither could the orphanage enforce training. The reasons for termination are only incidentally given for Utrecht orphans, but here too insufficient training and boys running away appear repeatedly. Orphan Kooten was for instance removed from a carpenter because his training was too limited.[2] Earlier Kooten had been fired by another carpenter without reason. Even after paying a premium orphan Kaaij was fired by a cobbler because of impoliteness.[3] A brother of Kooten who was placed at furniture making was fired as well, simply because there was not enough work.[4] The 100 *guilder* premium to watchmaker Henri also proved to be money wasted. He fired the orphan because he was incapable.[5]

Even when private parties such as an orphanage tried to promote training, by the end of the nineteenth century skill formation in the Dutch craft sector was mostly left by chance. Only the really adamant and motivated adolescent had a chance of making it as a skilled worker. Moreover, even after training they had limited options to signal their skills to other employers. 'These days, boys can no longer learn their craft at bosses', an inspector of secondary education lamented.[6] A lengthy contribution in the journal of the Dutch Society to Advance Industry (*Nederlandsche Maatschappij ter bevordering van Nijverheid*) in 1891 criticized the condition of Dutch on-the-job training in detail: 'Nowadays boys leave one boss after the other with the greatest triviality. […] The boss continuously fears that the boy will leave him to use his acquired skills at another boss. Bosses therefore slow down training by putting boys to work at specialised repetitive tasks, so that

1 HUA, Gereformeerd burgerweeshuis, inv. 47-18, p. 2615.
2 HUA, Gereformeerd burgerweeshuis, inv. 47-18, p. 2576.
3 HUA, Gereformeerd burgerweeshuis, inv. 47-18, p. 2592.
4 HUA, Gereformeerd burgerweeshuis, inv. 47-18, p. 2638.
5 HUA, Gereformeerd burgerweeshuis, inv. 47-18, p. 2729.
6 Arbeidsenquete 1890: Tweede afdeeling: Zwolle, Deventer, Kampen, response no. 1607.

they bring in the highest profits'.[1] This had apparently caused an abundant supply of mediocre workers to the detriment of skilled workers.[2]

Vocational schools as substitute?

Could the solution to these problems be found in replacing or supplementing on-the-job training with vocational schooling? From the end of the nineteenth century employer organisations, workers' organisations, and unions, together with the government, debated how to resolve the apparent deficiencies in on-the-job training for the crafts and industry. These debates have been extensively documented by Wolthuis and are therefore not repeated here.[3] What is interesting is that the outcome favoured the still small scale of Dutch firms and industry. Large firms, such as machine factory Stork, advocated a regulated apprenticeship system, with state subsidies and public bodies overseeing apprenticeship contracts, so that both apprentice and employer were given some safeguards enticing them to provide training. For small firms, who only needed a couple of workers, providing such apprenticeships would be too costly and difficult to coordinate.[4] Because of the small scale of most Dutch firms the chosen route was not a formal apprenticeship system but vocational daytime schools, coordinated by worker organisations and local authorities, and increasingly funded by municipalities and the central government.

Due to local initiatives by employer organisations and city boards, and the awarding of government subsidies from 1892, several vocational schools had been established by the 1870s.[5] By 1900 there were 22 vocational schools with 3,218 pupils, growing to 88 schools and 11,808 pupils by 1920.[6] Specific vocational schools targeting one craft in particular, such as tailoring, textiles, and shoe making, were also established (*vakscholen*). These schools were less popular than vocational schools. In 1921, 4,858 pupils attended these compared to 13,150 pupils at vocational schools.[7] From the end of the century the government in-

1 Orgaan der Nederlandsche Maatschappij ter bevordering van Nijverheid, vol. 2 (1891), p. 97. Cf. Thelen, How institutions evolve, p. 283.
2 Orgaan der Nederlandsche Maatschappij ter bevordering van Nijverheid, vol. 2 (1891), p. 96.
3 Wolthuis, Lower technical education in the Netherlands.
4 Anderson, 'The long road to collective skill formation', p. 113.
5 Wolthuis, Lower technical education in the Netherlands, p. 127.
6 Wolthuis, Lower technical education in the Netherlands, p. 153.
7 Verslag Onderwijs (1921).

creased subsidies to vocational daytime schools, becoming structural from 1919 onwards. By 1910 already more than 70 per cent of the costs of these schools was covered by a combination of subsidies from the government, the province, and towns or cities. This effectively shifted a share of training costs from adolescents to the state, and may have removed the insecurities of on-the-job training faced by adolescents and employers.[1]

Education at vocational daytime schools generally took three years and was a combination of theoretical and vocational courses. Pupils often enrolled after elementary school around the age of thirteen. Theory included technical drawing, theory of structures, physics, and sometimes steam engineering. Next to theory students chose one of the vocational tracks such as carpentry, forgery, painting, furniture making, or machine-fitting. The benefit of the bottom-up development of vocational schools was that courses were adapted to local demand. Given in by the building boom classes in carpentry were very popular in Amsterdam. In Breda courses in forgery were in high demand, possibly because of the presence of a military academy.

While the development of these vocational daytime schools is well known, it is unclear whether they actually provided an adequate solution to the training and provision of skilled manual workers. Even though tuition often could be kept low at around five *guilders* a year because of public funding, attending school still meant foregone earnings. This may not have been an issue as long as there were clear benefits of formal vocational schooling over on-the-job training. These benefits may have related to higher earnings, more efficient skill formation, or better access to the skilled labour market, but this has not been structurally examined. Nor have the presumed benefits of vocational schooling been compared to on-the-job training. Proponents of vocational schools of course argued that they offered a more efficient way of skill formation, but there is also evidence of employers disputing their use for industry and the crafts because they taught too few skills and too much theory.[2]

One way to evaluate the advantages of vocational schooling is to compare wage levels of its pupils to adolescents who were trained on-the-job. Between 1900 and 1920 the wages of graduated vocational school pupils are given in national education reports. The reports give the upper and lower bound of wages direct-

1 Mokyr, 'Human capital, useful knowledge', p. 259.

2 Wolthuis, Lower technical education in the Netherlands, pp. 138-9; Boekholt and De Booy, Geschiedenis van de school, p. 201; Giele, De arbeidsenquête van 1887, vol. 1, response no. 3264; Arbeidsenquete 1890: Tweede afdeeling: Zwolle, Deventer, Kampen, response nos. 1394-5; Arbeidsenquete 1890: Derde afdeeling: bedrijven in onderscheiden gemeenten, response no. 6897.

ly, and after one and two year after graduation, and were collected through a questionnaire per school. If every of the three cohorts responded to the questionnaire with the same frequency the response rate of graduates was about 25 per cent.[1] Using the upper and lower bound for all cities for the years 1900, 1905, 1910 and 1920 average wages were constructed for pupils directly, and one and two year after completing vocational school.

Existing wages of adolescents trained on-the-job in the literature are not detailed enough to compare them to these vocational school pupils. The wages received by Utrecht orphans can be used for comparison because their ages are known. This orphanage also sent some of its adolescents to the vocational school, which allows to compare wages between groups of orphans. As the vocational school took three years, wages received by orphans during their fourth year of working correspond to pupils who stated their wages directly after vocational school. Albeit the number of observations for Utrecht is quite small ($n = 35$) they may still be representative, because the wages of orphans with a vocational degree resemble the wages for Utrecht vocational school graduates in the education reports.

Table 3.3 gives hourly wages directly after vocational school in the Netherlands and Utrecht, and of Utrecht orphans with and without vocational schooling. If the vocational school enhanced skill formation, wages of adolescents with a degree should arguably be higher than those of Utrecht orphans who were trained on-the-job. These figures should evidently be taken with care, but they suggest that a vocational degree did not lead to higher wages. In all but one year did orphans with on-the-job training earn more than former vocational school pupils. The high wage of nine cents in the second column of 1905 is probably an outlier: there were no other pupils in the Netherlands who received such a high wage in this year, and the hourly wage one year after the Utrecht vocational school again mirror the orphans' wages one year later. A linear regression further demonstrates that within the group of orphans a vocational education had no significant effect on wages in the fourth and fifth year, i.e. one and two year after completing vocational school (Appendix Table A3.2). When controlling for the time spent on-the-job training, this table also suggests that a vocational degree did not pay off later on, because it did not significantly affect the highest wage received by orphans.

1 Number of graduates from Wolthuis, Lower technical education in the Netherlands, p. 153. In 1910 the number of responses per school strongly and significantly correlates to attendance levels, $r(64) = .78$, $p < .01$.

Table 3.3: Average wages of adolescents employed in the crafts in cents per hour.

Year	With vocational degree, Netherlands	With vocational degree, Utrecht	With vocational degree (orphans)	On-the-job training (orphans)
1900	6.1	7.5	7.0	9.1
1905	6.6	9	5.3	5.4
1910	7.1	7.5	8.8	9.6
1915	8.3	11.5	10.3	9.2
1920	12.4	18	17.1	18.9
Average	8.1	10.7	9.7	10.4

Notes: Weekly wages of orphans have been divided by the average number of hours orphans worked per week, which sources suggest was about 56 hours. Average wages for the Netherlands are weighted by the number of observations per school.
Sources: Verslag Onderwijs (1900-20); HUA, Gereformeerd burgerweeshuis, inv. nos. 772-3 through 772-5 (wages and hours worked).

The same exercise can be done with wages of Amsterdam orphans. For the period 1911-15 lists are available that give the weekly wages of orphans, as well as their age.[1] In total 311 observations have been collected. Since the ages of orphans are known and it is certain that they did not visit a vocational school, their wages can proxy for the remuneration of on-the-job training. Graduation of the vocational school generally occurred around the age of sixteen, so orphans' wages at age sixteen can be compared to the wages of Amsterdam vocational school graduates given in education reports.[2] Conversely, ages seventeen and eighteen approximate wages of vocational school pupils one and two year after graduation. To compare the weekly wages of orphans to hourly wages of the education reports, a working week of 55 hours has been assumed.[3] Since most orphans' wages are from 1911-12 they are compared to the wages of Amsterdam vocational school pupils from the education report of 1912.[4]

1 SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1094.
2 Verslag Onderwijs (1912), p. 276.
3 Around 1913 the average working week was 60 hours, but orphans probably worked somewhat less since they had to return to the orphanage during lunch every day, and for catechism on Tuesdays; De Economist, 1915, vol. 64 (1913), pp. 716-731. See also chapter two of this thesis.
4 Verslag Onderwijs (1912), pp. 292-3. There is no significant difference between the Amsterdam wages of this report and those from 1913 and 1914.

Figure 3.4 gives the distribution of the wages. For vocational pupils this distribution is somewhat flawed since only lower and upper bounds are given in the education reports.[1] It nevertheless gives a feeling for the range of wages received by both groups of adolescents. Mirroring the findings for Utrecht, it suggests that a vocational degree did not result in higher wages. Wages directly after graduation were comparable to sixteen-year-old orphans who had only received on-the-job training. Also one and two year after graduation these vocational school pupils were not paid wages very much different from on-the-job trained adolescents.[2] Apparently the beneficial effects of a vocational school were not (yet) found in higher wages.

Figure 3.4: Wages of Amsterdam orphans trained on-the-job compared to Amsterdam adolescents with a vocational degree.

Sources: SAA, Diaconieweeshuis der Hervormde Gemeente, inv. 1094; *Verslag Onderwijs* (1912).

Yet even without a wage effect vocational schools grew in popularity. At the Utrecht orphanage 64 per cent of orphans were sent to the vocational school between 1900 and 1915, whereas during 1865-1900 this had been only 29 per cent. This development was not confined to the orphanage. Vocational school attendance in the Netherlands outpaced population growth between 1890 and 1910. Attendance in this period increased by 80 per cent, while the population aged

1 The effect of outliers is somewhat eased by averaging the upper and lower bound for the two Amsterdam vocational schools.
2 Unpaired students' t-test per group are not significant: $t(71) = 0.299$, $p = 0.766$; $t(67) = 0.551$, $p = 0.583$; $t(34) = 1.450$, $p = 0.156$.

12-18 grew a mere fifteen per cent.[1] If a vocational degree did not lead to higher wages, why did adolescents attend these schools in growing numbers?

The education reports hint towards an answer, because they state if former pupils worked in the craft for which the vocational school had prepared them. Between 1900 and 1920 more than 90 per cent of the respondents worked within this craft one year after graduation.[2] After two years of graduation still 85 per cent worked within the craft the vocational school had trained them for. This stability may suggests that the benefits of a vocational school may not have been higher earnings but improved access to the crafts and subsequent job stability. It is nevertheless difficult to tell whether these results are biased. Successful pupils may have responded in larger numbers, perhaps also because they were easier to track down. Moreover, it is not clear whether these pupils had better access to the crafts compared to adolescents without a vocational education. At the Utrecht orphanage there seems to have been little difference, but the small sample size makes comparing the two groups problematic.

Militia registers are used to examine more closely whether vocational schools increased access to skilled positions in the crafts and industry. From 1862 all Dutch boys had to register for the army in the town of their parents at the age of nineteen, and every adolescent had to draw a number (which is why there were called 'draftees'). The lower the number, the higher the chances of being drafted for military service in the next year. Only physically unfit boys or boys from families where already a large number of boys served were excused. Until 1898 draftees could also find a replacement. For this paper these lists are of interest because they give a complete overview of the occupations of all nineteen-year-olds in a specific city during a specific year, thereby demonstrating how accessible a particular occupation was for this age group.[3]

The names of draftees were manually linked to vocational school enrolment registers. Since this is a time-consuming task and detailed enrolment registers are limited, this has been done for the provincial city of Breda for the years 1897-99 and 1910-11.[4] All names from the militia register of these years have been compared to names in vocational school enrolment lists of five to two years earlier.[5] To exami-

1 www.volkstellingen.nl (accessed November 4, 2014); Verslag Onderwijs (1890, 1909).
2 Verslag Onderwijs (1900, 1905, 1910, 1915, 1920).
3 Knotter, Economische transformatie, pp. 272–5.
4 Stadsarchief Breda (SAB), Archief Ambachtsschool, inv. nos. 38, 39; SAB, Archief Gemeente Breda 1815-1925, inv. nos. 3400, 3401, 3402, 3413, 3414 ('lotingsregisters'). All years refer to the year of registration, the official militia year falls one year later.
5 Adolescents in the militia registers could have enrolled in a vocational school anytime between the age of twelve to seventeen.

ne if after 1910 vocational schools improved access to the crafts, militia registers of Alkmaar have been consulted as well, for the years 1914-16 and 1919.[1] These registers already include the highest education level of every draftee.[2]

Keeping in mind that enrolling at a vocational school generally occurred between the ages of twelve to fourteen, the Breda militia registers represent about forty per cent of all cohort enrolments in both periods. Since a share of pupils registered for the army in another year, and pupils also came from outside Breda, this share seems acceptable. Moreover, the distribution of the draftees over the vocational school tracks does not significantly differ from the tracks chosen by all Breda pupils. Because for Alkmaar the education level is already given in the militia registers, these should be considered representative as well. However, in 1914 only three per cent of draftees reported to have attended the Alkmaar vocational school, whereas in the two subsequent years this share increased to around 7.5 per cent. This low share and the subsequent increase cannot be explained by attendance level trends.[3] Since education levels were only registered from 1913 it seems that in 1914 the register still suffered from underreporting.[4] The vocational schooling share of draftees from 1915, 1916 and 1919 resembles the local attendance rate of adolescents aged thirteen through eighteen more closely.[5] Militia year 1914 can therefore not be used for vocational school attendance.

Figure 3.5 groups the occupations of the draftees per city using HISCLASS, after dropping adolescents that were still enrolled in education, such as a secondary school or university.[6] It shows that draftees held positions in crafts and industry in large numbers (classes seven and eight), but also performed low and

1 The 'alphabetische naamlijsten' have been used for Alkmaar. These contain the same variables as the 'lotings-registers' of Breda.

2 Due to changes in the drafting process it is not possible to extent this method to after 1920.

3 Verslag Onderwijs (1910-20).

4 Recording education levels improved dramatically in Alkmaar between 1914 and 1919. In 1919 the education of only one draftee was missing, compared to 38 per cent in 1914. It is very likely that the missing education levels can be considered as elementary education. Adding these observations to elementary education results in a comparable share of nineteen-year olds with only elementary education in 1914 when compared to 1919.

5 Assuming that around 32.5 per cent of pupils came from outside the city (Verslag Onderwijs, 1915) this ratio was 8.6 per cent (119/1,376) in 1909; www.volkstellingen.nl (accessed November 4, 2014); Verslag Onderwijs (1909).

6 The distribution of occupations within each city is not significantly different between the registration years (Alkmaar: $x2$ (18, n = 574) = 25.815, p > 0.05; Breda: $x2$ (40, n = 993) = 46.875, p > 0.05).

unskilled jobs (classes nine through twelve). Since draftees aiming for more prestigious occupations were in general still enrolled at educational institutions this is not surprising. Because manual workers by the age of nineteen by and large had completed their schooling, this should not be an issue here.

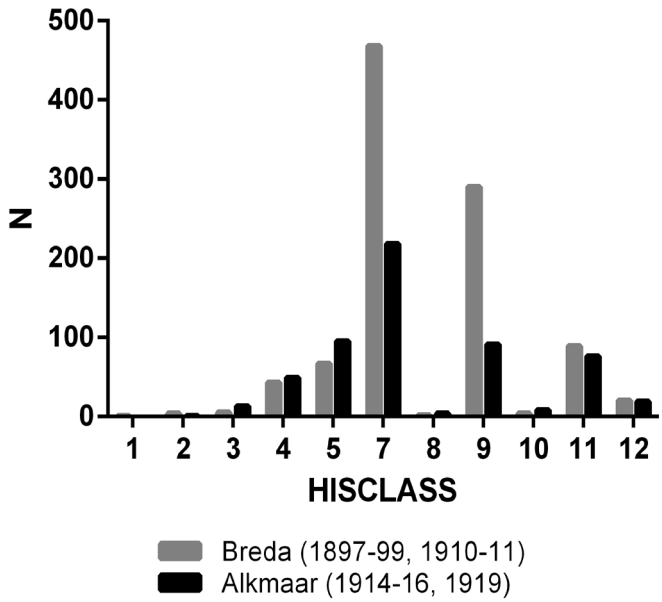


Figure 3.5: Distribution of the occupations of nineteen-year-olds.

HISCLASS:

1 Higher managers
2 Higher professionals
3 Lower managers
4 Lower prof. and clerical, sales
5 Lower clerical and sales
6 Foremen
7 Skilled workers
8 Farmers
9 Lower skilled workers
10 Lower skilled farm workers
11 Unskilled workers
12 Unskilled farm workers

Notes: HISCLASS group six is omitted because it has been assumed that draftees working in the crafts did not yet perform supervisory tasks. Draftees enrolled in education and without an occupation are excluded.
Source: Militia Database (n = 1,567).

The distribution of occupations shows some differences between Alkmaar and Breda.[1] Although in both cities crafts and industry were the dominant sectors for nineteen-year-olds, in Breda there were relatively more lower skilled workers amongst this age group (29 versus 16 per cent in HISCLASS nine). Perhaps this was caused by the presence of several chocolate, bread, and beer factories in Breda.[2] The presence of a military academy in Breda caused many draftees to enlist at the army voluntarily, perhaps because this provided better prospects than these unskilled jobs. Alkmaar had a larger share of draftees working in clerical positions. Nevertheless, resembling the findings above, a large share of draftees from both cities performed low and unskilled jobs. Many nineteen-year-olds performed very simple jobs such as shop assistant, messenger boy, goods porter, or were simply day-labourers and factory workers. According to the skill levels of HISCLASS, 48 per cent of the occupations of draftees from the two cities can be deemed unskilled or low skilled.[3]

Since on-the-job training proved a rather insecure route towards a position as manual skilled worker, attending a vocational school may have provided an alternative. Pupils should have benefitted especially in obtaining access to the specific crafts that were taught in separate tracks of vocational schools. These tracks could differ per city. Lathe-operating was for instance taught in Alkmaar but not in Breda, and the same applied vice versa for bricklaying. Using the education reports, these tracks have been coded for both cities, to see if employers from crafts for which a separate track existed valued these pupils over other adolescents. In other words, did pupils completing the blacksmith track have better chances of becoming a blacksmith?

Figure 3.6 gives the share of nineteen-year-olds holding a vocational day school degree in a specific track, and in the craft sector in general for both cities. With the exception of 1910 the share of draftees in the crafts and industry holding a vocational degree was somewhat higher in Breda. With only about 13 to 20 per cent of manual workers holding a degree, on-the-job training clearly provided access to these occupations as well. It is perhaps telling that the share of nineteen-year-olds with a vocational degree was much higher in the crafts that were specifically taught at vocational school tracks, especially in Breda. Both shares, nevertheless, do not demonstrate if all draftees with a vocational degree were better off as some may not have entered the crafts or industry at all. Moreover, amongst the occupations in Figure 3.6 are also relatively unskilled (factory) workers.

1 The difference in the distribution of occupations is significant: $x2$ (10, n = 1,567) = 105.167, $p < 0.01$.
2 Doorakkers, 'Over enige sociale en ekonomische aspekten', pp. 241–2.
3 Van Leeuwen and Maas, HISCLASS, p. 57.

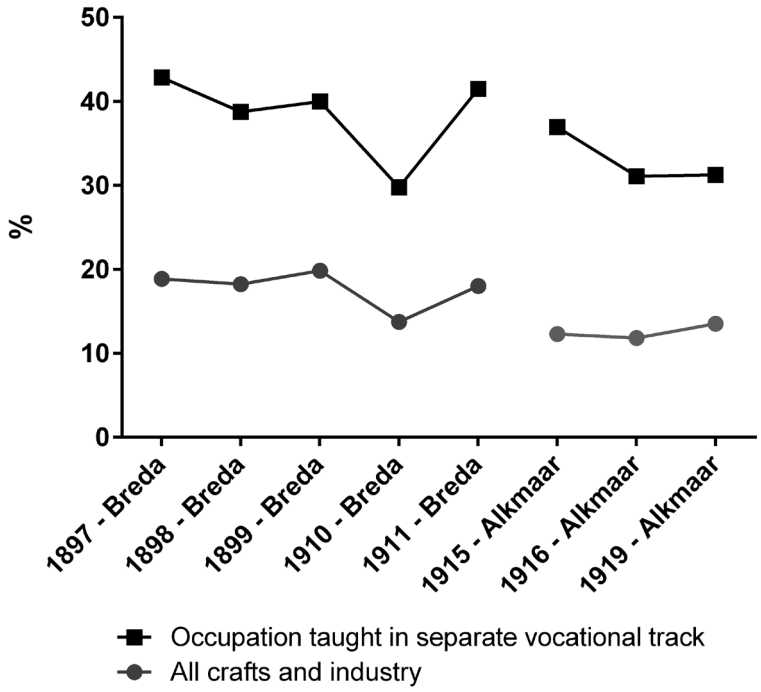


Figure 3.6: Share of nineteen-year-olds in crafts and industry with a vocational degree.

Notes: Crafts and industry has been defined as HISCO minorgroups 70 through 99.
Source: Militia database.

To see if a vocational degree indeed provided better access to the crafts and industry, to specific crafts in particular, and whether it lowered chances of ending up in an unskilled job, three binary logistic regressions were performed. The three dependent variables are access to crafts and industry in general; to an occupation that was taught in a vocational track; and to a position as unskilled industrial worker.[1] The crafts and industry are now defined as HISCO minorgroups 70 through 96, because we want to exclude unskilled positions from this analysis. The results are given in Table 3.4.

1 Unskilled occupations are again coded using the HISCLASS skill levels.

Table 3.4: Explaining access to crafts and industry, and unskilled work.

	Dependent variable		
	(1) Crafts and industry	(2) Occupation taught in vocational track	(3) Unskilled industrial occupation
Vocational degree	1.215 (6.91)***	2.939 (15.75)***	-2.08 (-4.48)***
Year/city			
1898 Breda	0.285 (1.33)	-.003 (-0.01)	-0.071 (-0.20)
1899 Breda	0.068 (0.32)	0.252 (0.94)	-0.008 (-0.02)
1910 Breda	-0.016 (-0.07)	0.218 (0.78)	-0.141 (-0.37)
1911 Breda	-0.104 (-0.50)	0.093 (0.34)	-0.367 (-0.94)
1915 Alkmaar	-0.495 (-2.29)**	0.060 (0.21)	0.762 (2.25)**
1916 Alkmaar	-0.606 (-2.87)***	0.065 (0.23)	0.282 (0.78)
1919 Alkmaar	-0.763 (-3.49)***	0.142 (0.51)	0.616 (1.70)*
Constant	0.190 (1.22)***	-1.710 (-8.28)***	-1.610 (-6.07)***
Pseudo R^2	0.046	0.183	0.059
Observations	1,567	1,567	1,019

Notes: Binary logistic regressions with z-scores in parentheses. Reference group for year/city is *1897 Breda*, reference group for vocational degree is *no degree*. Coefficients marked *, **, and *** are significant at the 10%, 5%, and 1% level.

Source: Militia database.

Excluding unskilled factory work, the results of regression 1 indicate that a vocational degree significantly increased access to occupations in crafts and industry in general. Draftees with a vocational degree were about 26 per cent more likely to secure an occupation here compared to those without a degree. In Breda this effect was alike throughout the period. In Alkmaar chances of securing a position here dropped somewhat between 1915 and 1919, also for those with a degree. Perhaps during this period the share of unskilled workers in the crafts and industry increased to the detriment of skilled workers. The significant marks at the years 1915 and 1919 in regression 3 are consistent with this since they show increased chances on unskilled work in Alkmaar. Census data

for these years is regrettably not detailed enough on local level to examine this further.

Additionally, regression 2 shows that in Alkmaar access to occupations taught in specific vocational tracks did not decline significantly between 1915 and 1919, and that those with a degree had significantly better access to these jobs. This could suggest that if the skilled workforce indeed declined, a vocational degree proved a safeguard to maintain access to the decreasing number of skilled jobs. When competition for these jobs increased a degree may have proven decisive. In general, regression 2 shows that draftees with a vocational degree were as much as 62 per cent more likely to secure a position in a craft they had learned at the vocational school, compared to draftees without a vocational degree. Nearly all pupils ended up in the specific craft they had been trained for. Last, regression 3 as expected demonstrates that a vocational degree significantly decreased the likelihood of ending up as an unskilled industrial worker, by about sixteen per cent.

How to square absent wage effects of a vocational degree with these significant better chances on the labour market for skilled manual workers? If it was not more skills it is likely that the benefits of a degree were probably to be found in the signalling function it provided for employers.[1] A degree could have lowered the uncertainty that characterized on-the-job training. Without a degree employers were never quite sure of the capabilities and perseverance of boys. As demonstrated this made trainability unsure, caused high levels of mobility, attrition, and uncertain employment. Although adolescents with a degree may not have been relatively more skilled, a degree made skills and perseverance observable. In comparison with on-the-job training, an employer would have had much better information about the determination and trainability of the adolescent. The fact the he had gone to three years of foregone earnings and schooling signalled this. Even though he had not acquired (much) more skills during this period than boys trained on-the-job, he was motivated enough to stay in school, learn the craft, and obtain a degree. For an employer it did probably not really matter if the school had taught him to persist or whether the pupil already possessed these characteristics before (i.e. that he was positively self-selected into school), but that this could be objectively observed through a degree.

A degree provided information about worker characteristics that had earlier been largely unobservable at hiring. Without a degree as signalling device these could only be discovered afterwards. Vocational schools accordingly took away from employers a large part of the costly, timely, and uncertain process of fil-

1 Cf. Connelly et al., 'Signaling theory'.

tering out the most talented and motivated young workers, as happened in late nineteenth-century Amsterdam, and possibly in the Netherlands in general. Adolescents with a degree were therefore a step ahead. For that reason they too had a strong incentive to use these schools, even if skill formation was the same compared to on-the-job training. Perhaps vocational schools thereby provided a function equivalent to the craft guilds, which had also provided training certification. Since the labour market was no longer restricted, and demand for unskilled labour probably increased faster than demand for skilled labour, training certification may even have been more important than before.[1]

Vocational schools and the skill premium

For adolescents and employers vocational school were beneficial because they removed training and selecting uncertainties. To approximate how important vocational schools were for providing skilled manual workers for the industrialising economy as a whole, two indirect measures can be used. The first is to simply estimate how many skilled workers were provided by the vocational schools and compare this to the total skilled male workforce in industry. The second measure is to look at the wage level of skilled workers and the skill premium. Theoretically, an undersupply of either group of manual workers would cause wages to increase, and vice versa.[2] The skill premium can proxy for an efficient supply of human capital.[3]

To begin with the first measure we need to estimate how many skilled manual workers were needed to replenish the worker stock annually. Census data from 1909 gives a male workforce in crafts and industry of around 621,500.[4] It is difficult to say how many of these were skilled, but according to the militia data at least 27 per cent of the nineteen-year-olds in crafts and industry were low and unskilled. This seems a conservative estimate; some studies report regional shares of unskilled workers as high as 60 per cent.[5] If we take a conservative share of 30 per cent unskilled workers, assume that the age distribution of workers was even, and a working career lasted 40 years, about 10,850 skilled industrial and craft workers retired in 1909.[6] Vocational schools awarded 1,479 degrees in 1909, which means

1 Van Zanden and Van Riel, Nederland 1780-1914, p. 308.
2 Goldin and Katz, The race between education and technology, p. 91.
3 Van Zanden, 'The skill premium'.
4 De Jonge, De industrialisatie in Nederland, pp. 228–9.
5 Van Dijk, Visser, and Wolst, 'Regional differences in social mobility', p. 438.
6 Van Poppel et al., 'Hoe lang leefden wij?'.

that these adolescents could have replaced about fourteen per cent of the retiring workforce.[1] If the same back-of-the-envelope calculation is repeated for the years 1920 and 1930 these shares are about 16 and 26 per cent respectively.[2] This suggests that especially from 1910, when new technologies such as electricity and gas were increasingly used in production, the share of skilled manual workers with a degree was far from trivial. In combination with adolescents who were still able to acquire skills through on-the-job training, this could have been sufficient to replenish the skilled workforce. For instance, it is perhaps not a coincidence that some Dutch railway companies discontinued their firm apprenticeships when vocational school attendance increased after 1900.[3]

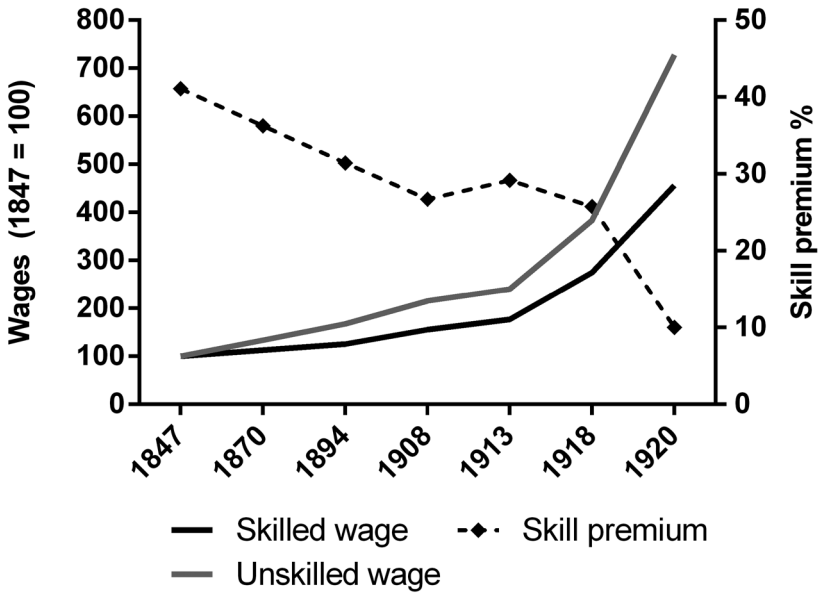


Figure 3.7: Indexed wages of manual workers (left) and the skill premium (right), 1847-1920.

Sources: De Economist, 2 (1853), 62 (1913), 64 (1915), 70 (1921).

1 Verslag Onderwijs (1909).
2 Assuming that crafts and industry in 1920 and 1930 comprised 70 per cent of the manual workforce (as in 1909). Figures from Reinalda, Bedienden georganiseerd, p. 511; Verslag Onderwijs (1909, 1920, 1929).
3 Dehing, Eene soort van dynastie, pp. 52, 104.

Relative wages provide a measure to evaluate if the supply of skilled manual workers was adequate. From issues of the journal *De Economist* wage data for skilled and unskilled manual workers has been collected for the years 1847, 1894, 1908, 1913, 1918, and 1920. The wages in general relate to the building industry, but also wages of blacksmiths and machine operators are given. The trends in these wages can proxy for the relative supply of skilled manual workers during Dutch industrialisation. In Figure 3.7 the indexed wages are given, as well as the skill premium, i.e. how much skilled workers earned more than unskilled workers. The year 1870 is interpolated.

The declining skill premium suggests that there was not an undersupply of skilled workers between 1847 and 1908. The indexed wages suggest that this was partly caused by a growing relative demand for unskilled workers. Between 1908 and 1918 the skill premium became more or less constant, which may indicate that growing demand for skilled workers because of the use of new technologies was matched by supply. The reported absence of a wage premium for a vocational degree after 1900 seems in line with this finding.[1] By 1920 the skill premium declined to around ten per cent, while at the same time wages for unskilled workers continued to grow faster than those of skilled workers.[2] It may be no coincidence that the skill premium declined sharply around 1920, because by this time many schools had made tuition contingent upon parents' income and lowered tuition fees. In 1918 nearly all vocational schools charged progressive fees.[3] Together with increasing reals wages this allowed more families to send their children to post-elementary education.[4] As demonstrated, now a larger share of the skilled workforce had a vocational degree, possibly causing a more than sufficient supply of skilled workers.

Conclusion

With the onset of Dutch industrialisation around 1870 on-the-job training in the Netherlands was slow and insecure. Boys wandered from job to job because they were easily fired, or because they left their bosses in search for higher wages or better training. Without skill certification or apprenticeship enforce-

1 Cf. Goldin and Katz, The race between education and technology, pp. 100–1.
2 This trend mirrors Van Zanden, Vermaas, and Verstegen, 'Income inequality in the 19th century', pp. 160-2.
3 Verslag Onderwijs (1918).
4 Vermaas, 'Real industrial wages', p. 148; Boekholt and De Booy, Geschiedenis van de school, p. 277.

ment training was uncertain. Boys had little reason to accept being used as cheap labourers, nor were they keen to accept lower wages to pay for training. As a result many of them ended up as unskilled labourers in blind-alley jobs. For the Dutch economy as a whole the downsides were nevertheless limited since demand for skilled workers decreased. Many employers simply did not need as many skilled workers as before because many tasks were mechanized and divided. This further reduced incentives to provide training. Vocational schools put skill formation on a more secure footing from the last decade of the nineteenth century. Skill formation by these schools may not have been superior to on-the-job training, but having a degree at least allowed adolescents to demonstrate skills and perseverance on the labour market. Therefore their chances of securing skilled jobs were much higher compared to youths trained on-the-job. Showing a degree meant that employers could skip the uncertain process of identifying the best employers.

Based on wage premiums and the skill premium, the supply of skilled workers probably matched demand. The combination of on-the-job training and vocational schooling ensured that during the period 1860-1920 the Dutch labour market had sufficient skilled workers at disposal. Because this increased supply of skilled workers through vocational schools coincided with a deskilling of a large share of the workforce, sufficient skilled workers were available for the Dutch crafts and industry. However, even in the face of a declining skill premium attending a vocational school still paid off because it ensured a future as skilled worker, a future that was much more difficult to achieve through on-the-job training. On the other hand, because unskilled wages were relatively high incentives to become skilled were relatively small.[1] Vocational schools therefore especially became more attractive when real wages started to increase and tuition was adapted to parents' income around 1920, causing skill formation to become cheaper for many families. The skill premium may have declined around 1920 because of this.

Whereas the United States opted for a formal schooling route, where general skills were taught, and Germany installed a regulated apprenticeship system, the Dutch case demonstrates yet another route towards providing sufficient skilled workers during industrialisation. One the one hand this shows that adaptation of training institutions could occur through different routes, depending on the structure of the economy and industry. With high geographic and labour mobility in the United States it probably made sense to teach general skills

1 Which was bemoaned by employers according to the Economist Vol. 70 (1921), p. 214.

at high schools.[1] In the more regionally oriented Dutch labour market, characterized by small firms, offering vocational schooling was probably more effective than general secondary education or apprenticeships. On the other hand, all three countries suggest that certification of skills may have been vital during industrialisation. Making skills observable lowered selection and training cost on a labour market in rapid transition, and ensured that employers could relatively easily select the most capable workers.[2] This absence of regulated skill certification may be one of the factors underlying English industrial retardation during the nineteenth-century.[3]

1 Goldin, 'The human-capital century', pp. 277-8.
2 Goldin and Katz, The race between education and technology, p. 90.
3 Green, 'Technical education', pp. 133–9.

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Appendix

A. Expressions included in the misconduct score (in Dutch):

brutaal	*oneerlijk*
diefstal	*onverschillig*
dronkenschap	*onwil*
eigenwijs	*te laat*
fraude	*wangedrag*
koppig	*weggejaagd*
lastig	*weggestuurd*
lui	

Table A3.1: Linear regression on average term per employer of Amsterdam orphan (months).

	Coefficient
Starting age	-0.003 (-0.03)
No. employers	-1.395 (-10.79)***
No. crafts	0.082 (0.39)
Misconduct score	2.186 (1.26)
Total length (months)	0.252 (13.95)***
Constant	6.005 (3.26)***
R^2	0.682
Observations	242

Notes: Standard errors are clustered by starting year of on-the-job training. Coefficients marked *, **, and *** are significant at the 10%, 5%, and 1% level.
Sources: see Figure 3.1.

Table A3.2: Linear regression on weekly wages of Utrecht orphans during on-the-job training.

	Dependent variable		
	(1)	(2)	(3)
	Natural log of wage in year four	Natural log of wage in year five	Natural log of highest wage received
Starting age	0.291 (3.21)***	0.197 (1.99)*	0.194 (4.19)***
No. of employers	0.169 (2.01)*	0.044 (0.52)	0.238 (5.56) ***
No. of crafts	-0.453 (-2.34)**	-0.230 (-1.24)	-0.543 (-5.515)***
Vocational degree	0.117 (0.62)	0.012 (0.07)	0.343 (1.65)
Begin year	-	-	0.007 (1.23)
Constant	1.635 (1.16)	3.330 (2.24)**	-10.375
R^2	0.252	0.123	0.260
Observations	70	65	116

Notes: Standard errors in regression 1 and 2 are clustered by starting year of on-the-job training. Standard errors in regression 3 are clustered by total time spent on-the-job. Coefficients marked *, **, and *** are significant at the 10%, 5%, and 1% level.
Sources: HUA, Gereformeerd burgerweeshuis, inv. nos. 772-3 through 772-5.

Chapter 4. Accounting for secondary schools: commercial training and the supply of Dutch white-collar workers, 1860-1920

Abstract: Several European countries experienced a growing demand for white-collar workers from the end of the nineteenth-century, yet the process of adapting education provision to these labour-market developments is poorly understood. Using firm and school registers this paper examines to what extent educational changes ensured a sufficient supply of skilled and low-skilled male white-collar workers in the Netherlands between 1860 and 1920. Wage trends and estimates of the supply of white-collar workers suggest that supply trailed demand until the first decade of the twentieth century. After that an increased supply of clerks through commercial schools, largely funded by municipalities, likely caused real clerical wages to structurally decline for both skilled and low-skilled white-collar workers. These results mirror findings for the United States and may also explain why wages of English white-collar workers declined during this period.

Keywords: white-collar workers, education, wages, labour market, Netherlands

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Introduction

During the second half of the nineteenth century the Dutch economy changed profoundly.[1] From the last quarter of the century trade, commerce, and services began to pick up, not least because of the liberalisation of colonial trade, and the transport and communication revolution brought about by steamships and the telegraph.[2] Growth in international trade and industrial expansion boosted banking and insurance, and industrial firms needed a more elaborate administration to manage their growing staff numbers. Clerical dealings became more intricate through new taxes and commercial laws, and because of the growing need to calculate actuarial probabilities and insurance risks.[3] This economic shift increased the demand for white-collar workers. The number of people employed in trade, commerce, and services increased by almost 75 per cent between 1899 and 1920, outpacing the growth of the total workforce.[4] Van Driel, De Goey and Van Gerwen found that the ratio of Dutch administrative workers to production workers grew from 3.8 to 8.2 between 1899 and 1920.[5] The total number of Dutch white collar workers increased from 40.000 in 1849 to almost 300.000 in 1909.[6] By all measures this period witnessed the emergence of the white-collar worker.[7]

This significant increase in the number of white-collar workers may have put pressure on the provision of education. Compared to industrial workers these workers needed more skills.[8] At least they were required to be literate, but also knowledge of foreign languages, accounting, economics and geography was at times required. These skills needed to be acquired somewhere, but the process of adapting education provision to the rise of the white-collar worker is poorly understood. There are nevertheless signs that some countries were more successful than others in providing these skills. In the nineteenth-century Scottish banking sector a shortage of skilled clerks led to poaching risks and high turnover rates of employees, while the Bank of England in the early nineteenth

1 Van Zanden and Van Riel, The strictures of inheritance.
2 Jonker and Sluyterman, At home on the world market; Van Zanden and Van Riel, The strictures of inheritance, 305–11; Horlings, The economic development of the Dutch service sector.
3 Schot et al. (eds.), Techniek in Nederland in de twintigste eeuw, vol. I: Techniek in ontwikkeling, pp. 224-5; Heller, London clerical workers, p. 133.
4 Brugmans, 'De beroepstelling van 1920', p. 209.
5 Van Driel, De Goey, and Van Gerwen, 'Testing the Chandler thesis', p. 446.
6 De Jonge, De industrialisatie in Nederland, p. 296.
7 Schot et al., Techniek in Nederland in de twintigste eeuw, vol. I, pp. 211-2.
8 Schulz, Maas, and Van Leeuwen, 'Employer's choice', p. 78.

century had to make up for the lack of skilled clerks by introducing examinations, and by using internal labour markets to retain staff.[1] Around 1900 skilled banking personnel was also in short supply in Australia.[2] Recent contributions on English clerks demonstrate that their real wages declined between the 1890s and World War I, but leave open the question if this was linked to an oversupply of clerks, possibly reinforced by the rise of commercial schooling taking place in the same period.[3] That this could well have been the case is demonstrated for the United States, for which has been argued that the 'high-school movement' caused the clerical wage premium to decline from the beginning of the twentieth century.[4]

This paper links up to this literature by examining how sufficient white-collar workers were educated during this period of profound labour-market transition in the Netherlands between 1860 and 1920. The Dutch case is interesting because its relatively late industrialisation meant that it needed to catch-up in the provision of white-collar workers relatively quickly. Apparently the Netherlands succeeded, because by 1920 the share of the Dutch workforce employed in the tertiary sector had surpassed that of Germany, France, and Denmark, and was on par with England and the United States.[5] Although it has recently been demonstrated that Dutch employers from the 1870s onwards selected workers predominantly on the basis of job-related characteristics (i.e. skills), it remains unknown how a sufficient number of workers was able to require the skills necessary at the office floor.[6] Did The Netherlands follow a comparable route as the United States, where local initiatives ensured that sufficient high schools were founded to educate white-collar workers? Did firms adjust their hiring policies and wages to the supply of these workers?

After outlining the definition of white-collar workers, the remainder of the paper examines the provision of skilled and lower-skilled clerks between 1860 and 1920 separately. The flow of adolescents from general and commercial secondary schools into skilled white-collar functions will be estimated using available and newly constructed datasets on pupils. Hiring policies and wages of the *Nederlandsche Handel-Maatschappij* suggest that insufficient skilled

1 Boot, 'Salaries and career earnings', pp. 647-50; Murphy, ''Writes a fair hand''.
2 Seltzer, 'Internal labour Markets', p. 240.
3 Heller and Kamleitner, 'Salaries and promotion opportunities'; Seltzer, 'Salaries and promotion opportunities'. On the rise of commercial schooling in London see Heller, London clerical workers, ch. 7.
4 Goldin and Katz, The race between education and technology, pp. 63-7, 71-2.
5 Brugmans, 'De beroepstelling van 1920', p. 210.
6 Schulz, Maas, and Van Leeuwen, 'Employer's choice'.

white-collar workers were provided until around 1910. After 1910 real wages structurally declined. The labour market for lower-skilled white-collar workers will subsequently be reconstructed using staff registers of two Amsterdam banks, demonstrating that lower-skilled white-collar workers were in short supply until about the turn of the century. Estimating the skill premium for clerical work suggests that afterwards part-time commercial schooling may have glutted that labour market for lower skilled white-collar work. At the same time employee turnover decreased and tenure increased, further demonstrating a loose labour market. It will be argued that the match between supply and demand was to a large extent facilitated by municipalities providing commercial schools, which supplemented schools installed by the central government.

Delineating white-collar workers

Before examining how the growing Dutch economy obtained sufficient white-collar workers, a description of which white-collar workers are considered is necessary. It should first be noted that only the education and earnings of male white-collar workers are examined. Data on wages and educational attainment of Dutch female white-collar workers could not be found. It further appears that female white-collar employment before the 1920s was relatively marginal and only related to clearly-defined low-skilled functions such as typing.[1] Any further promotion was hindered by marriage bars. In contrast to findings for England, female competition may have affected male white-collar earnings only from 1920 onwards, when most of the educational changes to provide white-collar workers had already been implemented.[2]

The HISCO and HISCLASS schemes provide a tool to group historical occupations based on the tasks and duties performed, and the skills required.[3] According to HISCLASS, white-collar workers should be regarded as all workers performing non-manual work, i.e. all those working with their 'head' instead

1 Reinalda, Bedienden georganiseerd, pp. 92-3, 277-9, 512-4. For a qualitative overview of female white-collar work see De Haan, Gender and the politics of office work.

2 Reinalda, Bedienden georganiseerd, 284, 419; Seltzer, 'The impact of female employment'.

3 Van Leeuwen and Maas, HISCLASS; Van Leeuwen, Maas, and Miles, HISCO. For a critical assessment of historical occupational classification schemes see Van de Putte, 'Occupational titles?'.

of with their 'hands'.[1] However, this would also include highly skilled professional occupations such as lawyers, physicians, notaries, teachers, and engineers, which are generally not referred to in the literature on white-collar workers, or are treated separately.[2] Moreover, because Dutch trade and commerce picked up in this period, it is especially interesting to examine the provision of white collar workers for these sectors. The provision of civil servants is also of interest because the Dutch government in this period increased its hiring standards to ensure that civil servants were skilled enough to perform their growing duties, while at the same time their numbers expanded.[3] Turning to the HISCO categorisation then suggests that with excluding the professions, all white-collar workers that are of interest for this paper are included in groups two to four, which are 'administrative and managerial workers', 'clerical and related workers', and 'sales workers'.[4] This ensures that not only office clerks are considered but also managers, supervisors, and people working in banking, trade, and transport.

Skill requirements within this group of white-collar workers were of course far from uniform. There were large differences between, say, a civil servant registering birth-certificates at the city hall, a merchant broker trading in shares or securities, and a factory manager supervising hundreds of labourers. It seems that two groups of skilled workers can be defined. On the one hand, the growth of firms and especially shipping companies increased demand for personnel that could draw consignment notes and invoices, and write business correspondence in foreign languages.[5] It also demanded more bookkeeping skills as more cash flows and accounts needed to be handled.[6] The rise of limited liability companies from the 1860s also led to an increased demand for financial management, while at the same time the separation between shareholders and managers stimulated bookkeeping and financial reporting, since shareholders wanted an overview of the state of the company.[7] Many white-collar workers therefore needed quite some skills.

Another group of white-collar workers, on the other hand, may not have needed many skills at all besides being literate and perhaps numerate. Especially from the turn of the century tasks within offices became increasingly divided

1 Van Leeuwen and Maas, HISCLASS, pp. 47-8.
2 Goldin and Katz, The race between education and technology, p. 67.
3 Randeraad, 'Ambtenaren in Nederland'.
4 Van Leeuwen, Maas, and Miles, HISCO, p. 39.
5 Brugmans, 'Uit de geschiedenis van het kantoor', p. 221.
6 Schot et al., Techniek in Nederland in de twintigste eeuw, vol. I, p. 223.
7 Schot et al., Techniek in Nederland in de twintigste eeuw, vol. I, p. 222.

into separate jobs.[1] Many clerical jobs became routinized and subdivided.[2] Producers of office equipment responded to this by supplying and developing more and more machines to make clerical work easier. Type writers, adding machines, and hectographs all added to the subdivision and segmentation of office work from the beginning of the twentieth century.[3] From 1914 onwards further innovation in office machines and the introduction of Hollerith machines further speeded the mechanization of the Dutch office and the division of clerical work.[4] As a result many white-collar workers only performed menial, repetitive, and relatively easy tasks.

The HISCLASS skills levels can be used to separate these two groups of white-collar workers.[5] The three HISCO groups outlined above consist of white-collar workers with low, medium, and high skill requirements.[6] Lower skilled white-collar workers were for instance office clerks, tellers, cashiers, messengers, typists, stenographers, and telegraphers. According to HISCLASS these lower skilled non-manual workers required some reading and calculating skills, but in general the educational requirements were no more than four years of primary schooling and some occupational instruction. Medium skilled white-collar workers were amongst others bank clerks, credit and stock brokers, insurance agents, wholesale merchants, and bookkeepers. These are thought to have needed secondary schooling or extensive vocational preparation. Higher skilled white-collar workers mainly consisted of managers, company directors, and supervisors, but also of accountants and administrative officers. Their educational attainment was completing secondary school, plus higher education or a prolonged period of vocational preparation.[7]

The provision of medium and high-skilled white-collar workers will be contrasted to low-skilled white-collar workers (skilled versus low-skilled). This division is both plausible and practical. Within HISCLASS the group of lower-skilled occupations is the largest, containing almost half of all occupations. Medium and high-skilled occupations make up 34 and 14 per cent respectively.[8] It is therefore likely that the number of pupils ending up in higher skilled

1 Schot et al., Techniek in Nederland in de twintigste eeuw, vol. I, p. 329-36.
2 Goldin and Katz, The race between education and technology, p. 173; Stovel, Savage, and Bearman, 'Ascription into Achievement', p. 365.
3 Schot et al., Techniek in Nederland in de twintigste eeuw, vol. I, pp. 230-1.
4 Schot et al., Techniek in Nederland in de twintigste eeuw, vol. I, pp. 237-52.
5 Van Leeuwen and Maas, HISCLASS, pp. 56-7.
6 Unskilled workers are not found amongst white-collar workers.
7 Van Leeuwen and Maas, HISCLASS, pp. 50-1.
8 Van Leeuwen and Maas, HISCLASS, p. 51.

white-collar occupations is relatively low and limits analysis. Combining high-skilled and medium-skilled then increases the number of observations. Moreover, Heller observed for late nineteenth-century London that differences in skill requirements caused two separate educational routes to emerge for white-collar workers based on skill requirements, namely 'ordinary' and 'higher' commercial education.[1] As will be demonstrated, a comparable division also emerged in the training of Dutch white-collar workers between 1860 and 1920.

Contemporaries expressed their concerns about the supply of skilled Dutch white-collar workers from the middle of the nineteenth century onwards. In 1845 several businessmen complained about their staff being unable to negotiate bills of exchange, check accounts, or handle the books, and had trouble corresponding with foreign offices. Apparently there was a 'great want of institutions, which provide a theoretical and practically oriented commercial education for decent adolescents'.[2] One author in the 1854 agreed that the supply of secondary education was insufficient, especially for positions in trade and commerce.[3] In 1869 the same journal reported the 'long-standing complaint' that foreigners working as clerks in the Netherlands were paid higher wages because they were better educated than their Dutch counterparts.[4] Around the 1860s Dutch railway companies indeed hired foreign clerks because of an absence of skilled Dutch clerks.[5]

Educating skilled white-collar workers

Since the 1840s many gymnasia, that traditionally prepared for university, had added a second track to offer more practical subjects such as modern languages and geography. Next to these there existed French schools, a collection of very diverse post-elementary schools operated on for-profit basis or (partly) funded by town councils.[6] Both schools had seen their attendance levels rising since the middle of the nineteenth century, demonstrating a demand for more practical post-elementary schooling.[7] The quality of both type of schools nevertheless

1 Heller, London clerical workers, pp. 27, 157-8.
2 Cited in Sleumer, Het economische onderwijs, p. 15.
3 Muller, 'Handels-opvoeding', pp. 225-7.
4 De Economist 18 (1869), p. 385.
5 Dehing, Eene soort van dynastie, p. 44.
6 Kloek and Mijnhardt, Dutch culture in a European perspective, pp. 243–64; Frijhoff, 'Crisis of modernisering?'.
7 Attendance of the second divisions of the gymnasia increased from 326 in 1848 to 625 in 1862; Verslag Onderwijs (1848, 1863).

varied, and they were generally not suited to train for trade and commerce as they rarely provided courses such as algebra or accounting.[1]

Not least due to pressures from business and industry, who argued that the quality of the diverse institutes for secondary education was very low in the absence of regulation, a secondary education law passed in 1863.[2] Designed by the minister of internal affairs, Thorbecke, the law formalised the diverse secondary schools into a new school type, called the *hoogere burgerschool* (higher civil school), or HBS.[3] This new type of general secondary education was deliberately placed between vocational schooling on the one hand and higher education on the other.[4] According to Thorbecke, the HBS was to educate middle-class adolescents who did not want to go to university for a diverse range of middle to high positions in trade, commerce, civil service, and industry.[5] They were relatively modern compared to secondary schools in the rest of Europe.[6] Amongst others the HBS was to secure the provision of white-collar workers. Separate commercial schools were not deemed necessary since the HBS would suffice.[7]

Table 4.1: Development of the HBS.

Year	Schools		Attendance	
	HBS5	*HBS3*	*HBS5*	*HBS3*
1870	32	11	2,674	418
1880	37	18	3,467	1,042
1890	37	23	4,270	1,381
1900	41	23	6,126	2,237
1910	58	27	7,894	2,864
1920	102	20	13,622	2,913
1930	129	11	19,223	1,844

Sources: Verslag Onderwijs, 1870-1920; *Statistiek van het voorbereidend hooger en middelbaar onderwijs 1931/32 – 1933/34*.

1 Muller, 'Handels-opvoeding', p. 227.
2 Boekholt and De Booy, Geschiedenis van de school, pp. 182-3.
3 The law also created other schools, such as civil (evening) schools, and a technical college and agricultural schools. These schools are left out of consideration because contrary to the HBS these were never intended to train clerks.
4 Boekholt and De Booy, Geschiedenis van de school, p. 181.
5 Boekholt and De Booy, Geschiedenis van de school, p. 188; Parvé, 'Overzicht van het middelbaar onderwijs', pp. 276-7.
6 Mandemakers, HBS en gymnasium, p. 117; Zijdeman and Mandemakers, 'De rol van het gymnasiaal en middelbaar onderwijs', p. 155.
7 Boekholt and De Booy, Geschiedenis van de school, pp. 188-9.

HBS were divided into a 3-year and a 5-year type (hereafter called HBS3 and HBS5). The government installed fifteen HBS to set an example, and town councils were free to choose either the 3-year or 5-year type depending on demand for secondary education, and received government subsidies when founding a HBS. The 5-year type was most popular and witnessed a continuous growth from 1870 onwards, as can be seen in Table 4.1. The number of HBS3 declined after 1910, and most had gone by 1930, primarily because commercial schools and part-time commercial education proved to be better tuned to labour market demand, as will be demonstrated below.

To examine the contribution of the HBS to the labour market for white-collar workers a dataset on the occupations of former HBS pupils has been used.[1] This dataset has been constructed by Zijdeman and Mandemakers for the project Historical Sample of the Netherlands (HSN), and gives the occupation at time of marriage of a sample of HBS3 and HBS5 pupils having started their education at 1880 and 1920.[2] The sample is representative for all HBS pupils in the Netherlands in both periods.[3] Measuring occupations at time of marriage is particularly useful because many HBS5 pupils, contrary to wishes of Thorbecke, went to university first. In 1920 almost half of all graduated pupils entered higher education.[4] These data demonstrate if they perhaps secured a white-collar occupation after attending higher education.[5] Table 4.2 gives the occupations of first-year HBS3 and HBS5 pupils in 1880 and 1920 at their time of their marriage using the occupational groups of HISCO.

1 On the success of the HBS5 for the development of Dutch science see Willink, 'Origins of the second golden age'.
2 R. L. Zijdeman, 'Historical Sample of the Population of the Netherlands (HSN). Marriage Certificates Pupils of Dutch Higher Secondary Education (HVL)' (2006), Release 2014_1. Available at http://www.iisg.nl/hsn/projects/hvl.html (accessed June 28, 2014). On the composition of the sample see Zijdeman and Mandemakers, 'De rol van het gymnasiaal en middelbaar onderwijs', pp. 157-61.
3 Zijdeman and Mandemakers, 'De rol van het gymnasiaal en middelbaar onderwijs', p. 158.
4 Verslag Onderwijs (1920).
5 It is not known exactly which of these pupils had attended university

Table 4.2: Occupations of first-year HBS5 pupils at marriage (n = 564).

HISCO Group	HBS3 (%)		HBS5 (%)	
	1880	1920	1880	1920
0/1 Professional, technical and related	24.77	20.55	38.93	33.19
2 Administrative and managerial workers	6.42	4.11	9.92	10.34
3 Clerical and related workers	31.19	36.99	16.79	23.71
4 Sales workers	20.18	24.66	16.79	16.38
5 Service workers	3.67	4.11	9.16	3.02
6 Agricultural and forestry workers	3.67	2.74	2.29	4.74
7/8/9 Production and related workers	10.09	6.85	4.58	8.19

Source: Zijdeman, 'Historical Sample of the Population of the Netherlands (HSN). Marriage Certificates Pupils of Dutch Higher Secondary Education (HVL)', Release 2014_1.

The largest share of HBS5 pupils ended up in the professions, and became lawyers, doctors, or secondary school teachers. Others studied to become engineers. However, the table also demonstrates that within both cohorts around half of all HBS3 and HBS5 pupils ended up as white-collar workers (groups two through four). Between the two periods this share increased for both groups of pupils by about 8 percentage points. As to be expected HBS5 pupils secured managerial positions relatively more often, and clerical and sales positions somewhat less than HBS3 pupils. When looking at the skill levels of the white-collar positions there was some difference between the pupils. This difference was most pronounced for low and high skilled positions. Fourteen per cent of all white-collar positions of HBS5 pupils were high skilled, compared to only 4,5 per cent of HBS3 pupils. It appears that for medium skilled positions such as retailer or bookkeeper the type of HBS did not really matter, as these shares were comparable between the schools. Of all white-collar positions of HBS3 pupils more than half was low skilled, and this share was 39 per cent for HBS5 pupils.

It is interesting that pupils of both groups also worked in low-skilled positions such as office clerk or civil servant at the municipality. Of all HBS5 pupils from the sample eighteen per cent became low skilled clerks, compared to 31 per cent of HBS3 pupils. It is possible that some of these pupils were drop-outs, but the data does not allow to distinguish between graduates and drop-outs. Nonetheless, the share of HBS dropouts significantly declined between 1880 and 1920, but in 1920 even a larger share of the white-collar positions of both

HBS3 and HBS5 pupils was low skilled.[1] Perhaps this demonstrates a gradual deskilling of white-collar work. It is also conceivable that these pupils were pushed into lower skilled positions because of competition from pupils of other schools.

With the share of HBS pupils entering the white-collar labour market established, it is possible to roughly estimate the contribution of both schools to supply of white collar workers. Data on the number of HBS pupils can be gathered from *Verslagen Onderwijs*, which were published annually by the Dutch government. These education reports give an overview of attendance levels, examinations, and also the occupations secured by several groups of pupils directly after graduation. The reports are mutually comparable because the method of recording and registering did not change much between the secondary education law of 1863 and 1930, although they did become gradually more detailed.[2]

In 1909 approximately 298.000 workers were employed in white-collar positions.[3] Assuming a working career lasted 40 years, about 7,500 new workers would have been needed annually.[4] Since HBS5 students could have attended some form of post-secondary education, graduation figures from 1908 are used to see how many new workers were provided by these schools. In this year 1,732 HBS pupils left school after graduation, of which 1,491 with a degree.[5] The education reports group HBS3 and HBS5 pupils together, but using the ratio of HBS5 to HBS3 students from Table 4.1 suggests that about 36 per cent of these pupils probably left the HBS3 and the remainder the HBS5. This leaves almost 1,100 HBS5 and about 625 HBS3 pupils. Based on the HSN sample about half of all these pupils may have secured a white-collar position, or around 850 pupils. Consequently, if new white-collar workers were only provided by the HBS there would have been a shortage of over 6,500 white-collar workers.

HBS pupils nevertheless aimed at medium and high-skilled functions in relatively large numbers, so this may be an unfair comparison. Again using the HSN sample, about 350 of the 850 HBS pupils becoming white-collar workers probably entered medium or high skilled functions (42 per cent). It is difficult to estimate how many medium and high-skilled white-collar workers were needed. Looking at white-collar workers in the arguably skilled sectors of banking, credit, insurance, and retail gives a male workforce of about 30,000, meaning

1 On the share of HBS drop-outs see Mandemakers, HBS en gymnasium, pp. 129-30, 141-3.
2 Mandemakers, HBS en gymnasium, pp. 38-9.
3 De Jonge, De industrialisatie in Nederland, p. 296.
4 Van Poppel et al., 'Hoe lang leefden wij?'.
5 Verslag Onderwijs (1908).

that roughly 700 skilled white-collar workers may have been needed annually.[1] Accordingly, around the turn of the century these schools did not provide enough pupils for the expanding labour market of medium and high skilled white-collar workers, and could never have replenished the lower-skilled segment of the market.

Adapting commercial education

The undersupply of white-collar workers translated into complaints about commercial training. A committee installed to examine Dutch commercial shipping in 1874 reported that overseas trade would benefit amongst others from the founding of public commercial schools, since their recruitment 'was now left to chance'.[2] In 1876 a reviewer in the journal *De Gids* concluded that the HBS 'estranged' adolescents from trade and commerce because the level of education was too high and did not relate to trade.[3] The inspector of secondary education in 1871 also stated that the HBS did not suffice for those wanting to go into trade and commerce. This opinion was repeated in 1898 by the politician Bos, who called for a restructuring of the HBS to adapt it to the demands from trade and industry.[4]

After a private commercial school in Amsterdam had closed because its founder, Samuel Sarphati, had died, the Amsterdam city council decided to continue the provision of commercial education in 1869.[5] In 1882 the Amsterdam city council merged the HBS3 with this commercial school (*Hoogere handelsschool*), the latter consisting of two extra years of schooling (HBS3 + 2-year commercial school).[6] This combined a general preparatory education of three years with two years of classes on business and trade skills. This example was gradually copied by several other towns and cities. It was also possible to found a separate commercial *day* school (*Handelsdagschool*) of three to four years instead of a

1 Reinalda, Bedienden georganiseerd, pp. 513-4. I have given only the number of men because women performed relatively low-skilled white-collar work; De Haan, Gender and the politics of office work.
2 "Enquête omtrent den toestand van de Nederlandsche koopvaardijvloot", Kamerstuk Tweede Kamer 1874-1875, kamerstuknummer 7, ondernummer 1.
3 De Gids, vol. 40 (1876), pp. 380-7.
4 Sleumer, Het economische onderwijs, pp. 29-30, 67.
5 Boissevain, Gedenkboek 50-jarig bestaan Openbare Handelsschool te Amsterdam, p. 13.
6 Elzinga, De grondslagen der maatschappijschool, p. 71.

HBS3, which was then followed by one or two years at the commercial school (commercial *day* school + commercial school).[1] The number of commercial schools increased from the end of the nineteenth century. By 1900 Amsterdam, Groningen, Utrecht, Rotterdam, Amersfoort had founded commercial schools. By 1910 their number had increased to 17. In 1915 there were 29 commercial schools with almost 1,500 pupils. By 1920 the number of commercial school pupils (3,971) considerably exceeded the number of HBS3 students.

The Dutch central government was not inclined to fund these commercial schools, even though in 1903 they signalled an increasing demand.[2] From 1906 the central government started to subsidize fifty per cent of the net costs of public commercial schools at most, but only if city councils and the province contributed the other half.[3] This caused many disputes, and the decision was not legally binding, so government funding was still left to chance. In 1910 the central government was still of the opinion that city councils should only fund commercial schools if private initiative fell short.[4] In this year public commercial schools received subsidies from the central government amounting to only fl. 11,000.[5] Moreover, in 1915 the central government turned down many subsidy requests for public commercial schools because the poor state of the treasury did not permit these expenses.[6] Apart from some government funding for public commercial schools, private commercial schools remained without subsidies at all until 1915.

It was not the central government but municipalities who funded the expansion of these commercial schools.[7] Although there were some economies of scale, such as using the building of a HBS for the commercial school as well, this did come at quite some costs for municipalities. In 1918 Dutch municipalities together funded almost half of all costs of day and evening schools, both public and private. The central government only funded about eighteen per cent, and tuition covered another 21 per cent of total costs. Business societies and chambers of commerce often initiated commercial schools but rarely bore a large share of costs. In 1918 business societies contributed 22 per cent of the costs of private commercial day schools and ten per cent of private commercial evening schools. In 1918 municipalities paid about fl. 250 for every commercial school

1 Elzinga, De grondslagen der maatschappijschool, p. 74.
2 Kamerstuk Tweede Kamer 1903-1904, kamerstuknummer 64 ondernummer 3.
3 Kamerstuk Tweede Kamer 1907-1908, kamerstuknummer 2 V ondernummer 13.
4 Kamerstuk Tweede Kamer 1910-1911, kamerstuknummer 2 V ondernummer 13.
5 Verslag Onderwijs (1910).
6 Verslag Onderwijs (1915).
7 Cf. Weiss, 'Educating for clerical work', p. 417.

pupil, while their contribution per HBS pupil was only half that amount.[1]

Local public funding allowed commercial schools to keep tuition relatively low, thereby increasing access and making commercial schools competitive with the HBS. Tuition at public commercial schools was comparable to the HBS3, especially during the first three years. 80 per cent of all commercial school students in 1910 attended a public school, and attendance at private commercial schools only seems to have picked up once subsidies allowed to lower their tuition fees as well.[2] Moreover, between 1910 and 1920 many cities and towns followed the HBS5 in making commercial school tuition contingent upon parents' income, so poor students paid far less or sometimes even nothing at all.[3] An annual income of under fl. 700 generally exempted parents from paying tuition.[4]

While the first two years of many commercial *day* schools were comparable to a HBS3, from year three the focus on trade and commerce increased. The main difference during year one and two between a HBS3 and the commercial *day* school was that the latter offered around three hours a week on business courses. During the third year this increased to up to ten hours.[5] Language courses in commercial schools further emphasized commercial correspondence.[6] Students entering the fourth and fifth class of the commercial school entirely focussed on business training and languages and received training in bookkeeping, commercial law, business correspondence, and sometimes marketing. To avoid confusion, commercial and commercial *day* schools will be referred to as commercial schools unless otherwise stated.[7]

To examine whether these commercial schools filled the gap left by the HBS, occupations of these pupils have been collected for several benchmark years between 1890 and 1935 from annual city reports and school enrolment figures from the cities of Alkmaar, The Hague, Rotterdam, and Utrecht. In these towns pupils could choose several types of secondary schooling, meaning that we can compare if local commercial schools did better in providing clerks than

1 Verslag Onderwijs (1918).
2 Verslag Onderwijs (1910, 1915).
3 Mandemakers, HBS en gymnasium, pp. 154-6.
4 Verslagen en handelingen van de gemeenteraad 's-Gravenhage 1851-2005, Verzamelingen (1920), no. 921, Bijlage II.
5 Regionaal Archief Alkmaar, Archief Gemeente Alkmaar, 1816-1919, inv. 1873, program of the commercial day school, 1911-12.
6 Regionaal Archief Alkmaar, Archief Gemeente Alkmaar, 1816-1919, inv. 1873, founding deed commercial school, 1915, article 1.
7 The education report of 1909 shows that the curriculum of most commercial schools was comparable; Verslag Onderwijs (1909), 232.

the HBS. With the exception of Alkmaar, all of them housed both a HBS3 and a commercial school at some point between 1890 and 1935. Alkmaar had no HBS3 but founded a commercial *day* school in 1911, to which a commercial school was added in 1915.

The reports do not list occupations of HBS5 pupils, but the occupations of HBS3 and commercial pupils are given, as well as drop-outs.[1] The occupations are recorded directly after leaving school. The distribution may therefore differ from the HSN dataset, who were observed at an older age. Although a disadvantage is that occupations may have changed after this early stage of their career, it does demonstrate to which types of occupations these newcomers on the labour market had access. Since we want to measure relative access to these jobs directly after school, pupils who enrolled in further education are dropped.[2] The sample comprises approximately 25 per cent of HBS3 and commercial school pupils.[3] Around a quarter of occupations is unknown, but the share of missing observations is comparable between the groups of pupils. These have therefore been dropped as well. After these corrections 40 per cent of HBS3 pupils becoming white-collar workers were medium or high-skilled, approximating the share of HBS3 pupils from the HSN sample (47 per cent).

The distribution of the occupations of the pupils can be seen in Table 4.3. The drop-outs are both HBS3 and commercial school dropouts, because it could not be inferred which school the reports referred to. It is apparent that pupils of all groups secured positions as white-collar workers in large numbers directly after school. A commercial degree specifically helped in securing a job in 'sales', which is precisely what the commercial schools aimed at. In many cases these were occupations related to finance, international trade and banking. Several Rotterdam students with a commercial degree were for instance hired by the *Twentsche Bank*, whereas none of the Rotterdam HBS3 graduates obtained a job here. From the Rotterdam pupils only those with a commercial degree ended up at accountancy firms and the *Amsterdamsche bank*.

It is possible to test whether these individual examples delineate a broader trend, with commercial school pupils ending up in skilled white-collar positions in larger numbers than HBS3 pupils and drop-outs. Compared to the occupations recorded in the *Verslagen Onderwijs*, most observations are detailed enough to assign a skill level on the basis of HISCLASS. To see if a commercial

1 For practical reasons both types of commercial school pupils are grouped. However, there appears to have been little difference between their occupational skill levels or their distribution over occupations.
2 Unemployment was only mentioned in less than two per cent of all observations.
3 Verslag Onderwijs (1915).

school indeed mattered for skilled white-collar work, a binary logistic regression was conducted with medium and high-skilled white-collar work as the dependent variable. Type of degree and the period of leaving school are used a predictors. The results of the logistic regression are given in Table 4.4.

Table 4.3: Occupations of drop-outs, HBS3, and commercial school pupils per occupational group, 1890-1935.

HISCO group		Drop-out	HBS3 degree	Commercial degree
0/1	Professional, technical and related	8	19	4
2	Administrative and managerial workers	6	20	12
3	Clerical and related workers	80	248	235
4	Sales workers	52	95	215
5	Service workers	3	5	10
6	Agricultural and forestry workers	2	3	0
7/8/9	Production and related workers	8	6	0
	Total	159	396	476

Notes: For practical reasons both types of commercial school pupils have been grouped. There appears to have been little difference between their occupational skill levels or their distribution over occupations.
Sources: Het Utrechts Archief (HUA), Archief Gemeentebestuur van Utrecht 1813-1969: deel 2, inv. 10967; HUA, Gemeentebestuur van Utrecht 1813-1969: deel 3, inv. 28368, inv. 28370, inv. 28371; Gemeente Archief Rotterdam, Archieven van de Eerste Gemeentelijke Handelsschool aan het Van Alkemadeplein/ Handels –HBS te Rotterdam, inv. 40, inv. 41; *Verslag van den toestand der gemeente Alkmaar over …* (1912, 1915, 1918, 1923, 1927, 1930); *Verslag van den toestand der gemeente 's-Gravenhage over …* (1885, 1891, 1895, 1900, 1905, 1910, 1915, 1920, 1924, 1926, 1932).

The results demonstrate that even while a very large share of all pupils ended up as white-collar workers, those with a commercial degree ended up in skilled white-collar workers significantly more often. Relative to HBS3 pupils chances of skilled work were almost ten per cent higher. Compared to drop-outs a commercial degree increased chances of skilled white-collar work by thirteen per cent. These pupils may have positively self-selected themselves for commercial schooling, but it is also possible that the courses taught in commercial schools provided a better preparation for the skilled segment of the labour market for

white-collar workers. Whatever the case, it is apparent that employers seems to have valued commercial school pupils over other pupils. When repeating the regression for low-skilled white collar work there is no significant effect of having a commercial degree, demonstrating that commercial schools in particular served the higher end of the labour market.[1] After 1900 chances of obtaining white-collar work significantly increased, possibly because of the expansion of the labour market for white-collar workers. Especially the period until 1910 seems to have been a time of increased demand for white-collar workers.

Table 4.4: Binary logistic regression for variables predicting probability of obtaining a skilled white-collar position for the sample of HBS3 and commercial school pupils, with marginal effects.

Predictor	Coefficient	SE	*p*	Marginal effect	SE	*p*
Type of degree						
HBS3 degree	0.447	0.397	.260	0.044	0.040	.275
Commercial degree	2.207	0.639	.001	0.130	0.039	.001
Period						
1901-1910	3.583	1.032	.001	0.189	0.037	.000
1911-1920	2.066	0.581	.000	0.162	0.040	.000
1921-1935	1.311	0.484	.007	0.128	0.046	.006
Constant	0.374	0.355	.292			
X^2	83.98					
Pseudo R^2	0.272					
Observations	532					

Notes: Dependent variable is a skilled white-collar occupation, coded 1 if the occupation was classified under HISCO groups two through four, and the HISCLASS skill level was high or medium. Reference category for type of degree is *drop-out*. Reference for period is *1860-1900*.
Sources: see Table 4.3.

Interestingly, there was no significant difference in access to skilled functions between drop-outs and HBS3 pupils. Perhaps both entered offices into en-

1 See Appendix Table A4.1.

try-level functions. Commercial school pupils may have been better able to obtain positions higher on the career ladder immediately after school. A report of the working conditions of Amsterdam clerks from 1903 indeed stated that some offices paid twice as much to commercial and HBS5 graduates than to HBS3 graduates.[1] And only these pupils were sometimes given the chance to try out different functions within the office when being hired.[2]

With the number of commercial schools only surpassing the number of HBS3 around 1915, there nevertheless still may have been an undersupply of skilled white-collar workers. For instance, in 1915 only about 350 pupils left commercial schools and in 1910 this number probably did not exceed 175.[3] Based on the sample more than 75 per cent of these pupils secured a medium or high skilled white-collar function between 1900 and 1920. This means that by 1909 around 130 commercial pupils entered medium or high skilled white-collar work. Recalling that in 1909 some 700 of these workers were needed, and that the HBS may have provided about 350, the contribution of the commercial schools to the supply of skilled workers was nevertheless relatively sizeable compared to its attendance levels. Although there still was an undersupply before 1910, quickly rising attendance levels of commercial schools – from 1,443 in 1910 to almost 4,000 in 1920 – could well have resolved this within a decade.[4] This seems to be confirmed when looking at wages of skilled white-collar workers.

Hiring skilled white-collar workers

Wages paid to skilled white-collar workers by the largest Dutch trading and banking firm, together with its hiring practices, suggest that commercial schools reduced the undersupply of skilled white-collar workers from about 1910. The *Nederlandsche Handel-Maatschappij* (NHM) was established in 1824 to promote Dutch international shipping and trade, especially with the Dutch colonies in Asia.[5] During the nineteenth century its activities mainly consisted of importing and exporting goods from the colonies to the Netherlands, collecting taxes in kind of the cultivation system, and some banking activities. With the decline of the cultivation system from 1870, which allocated a share of Indonesian agriculture to export crops, the NHM increased its activities in banking,

1 De toestand der handels- en kantoorbedienden te Amsterdam, vol. I, p. 14.
2 De toestand der handels- en kantoorbedienden te Amsterdam, vol. I, p. 27.
3 Verslag Onderwijs (1910, 1915).
4 Hoksbergen, Ons handels(avond)onderwijs, p. 17.
5 Van Zanden and Van Riel, The strictures of inheritance, p. 112.

investing, and finance. From 1880 its involvement in trade decline and were replaced by banking activities such as investment banking (underwriting and credit), bill broking, monetary exchange, and private equity financing of ventures and shipping with the Indonesian Archipelago.[1]

Operations there were carried out by local branches where Dutch staff was placed. In 1916 the NHM had 22 branches in the Indonesian Archipelago, together with five offices in other parts of Asia.[2] The Dutch staff sent out to these branches had to manage local affairs, which involved banking, currency exchange, bill broking, consigning, and managing and recording all these dealings. The Dutch staff was in charge of the branches and were supervised by the office in Batavia. These employees needed to be knowledgeable about banking, trade, and accounting – exactly those subjects that proponents of the commercial school deemed too complicated to be learned on-the-job any longer.

Data were collected on the credentials and wages of NHM staff sent out to Asia to work at these local branches between 1863 and 1949. Although this represents a somewhat special group because they had to be willing to emigrate, their tasks are representative for those working in skilled functions in finance, trade and banking. Because the staff registers combine information on education levels and employment history, it is one of the only Dutch sources allowing to examine which combination of education and work experience provided the fastest route towards high-end white-collar positions. With annual salaries of around 2,400 *guilders* these positions paid very well, and comprised the 'clerical elite'. Another advantage is that the number of staff is relatively high and covers a long period, from 1861 to 1940.[3]

Only new staff of which at least one wage observation is recorded were collected, resulting in 434 employees. The trend in the number of staff collected is consistent with the total NHM staff employed in Asia.[4] The upsurge in the early 1920s can be explained by the rapid increase in functions between 1910 and 1928, and by a larger number of employees quitting or being fired.[5] Since the NHM paid all staff sent at the Asia branches according to a fixed pay scale, sometimes adjusted for local costs of living, salaries paid to these employees cannot be used

1 For instance, bill discounting amounted by 1916 amounted to fl. 60.1 million whereas it had been only fl. 3.2 million in 1880. The sum of issued prolongaties increased from fl. 6.1 to fl. 112.2 million in the same period; De Graaf, Voor handel en maatschappij, pp. 88-95, 126-7.
2 De Graaf, Voor handel en maatschappij, p. 237.
3 Van Zanden and Van Riel, The strictures of inheritance, p. 206.
4 De Graaf, Voor handel en maatschappij, pp. 111, 243-4.
5 De Graaf, Voor handel en maatschappij, pp. 243-4.

to infer skills. This fixed pay scale suggests that considerations on skill level, or trainability, were instead made prior to employment. The combination of credentials and working experience therefore demonstrates who were deemed most capable for these positions by the directors of the NHM.

Credentials of staff hired for the Asia branches can be seen in Table 4.5. An absence of credentials before 1890 demonstrates that working experience alone probably sufficed between 1861 and 1889. Between 1861 and 1889 the NHM only hired someone with a commercial degree in 1878. The category 'not recorded' very likely represents employees without a relevant secondary education, and only completed elementary school. This suggests that employees of which no education was recorded between 1861 and 1895 had acquired their knowledge on trade and banking on-the-job instead. Before being hired employees without a recorded education had indeed worked for extended periods of about 5.5 years on average. One employee hired in 1895 for instance had worked for several Amsterdam firms from at least the age of seventeen.[1] The only applicant with a commercial degree had worked for around four years before being hired, further indicating that in this period the value of this degree did not yet replace working experience.

Table 4.5: Credentials of NHM staff in Asia.

	1861-89	1890-99	1900-09	1910-19	1920-29	1930-49	%
Higher education	0	0	1	1	9	3	3
Higher commercial school	0	0	0	3	7	4	3
Commercial school	1	18	44	76	72	9	51
Gymnasium	1	2	1	3	2	3	3
HBS5	0	3	9	17	21	16	15
HBS3	0	1	2	10	6	1	5
Elementary school	0	1	0	6	9	2	4
Other	0	0	0	3	2	6	3
Not recorded	23	27	5	3	1	0	14
Total	25	52	62	122	129	44	100

Notes: HBS5 includes HBS5-A students from 1920.
Sources: Nationaal Archief (NA), Archief van de Nederlandsche Handel-Maatschappij (NHM), (1784) 1824-1964 (1994), inv. 15604, inv. 15605 inv. 15606.

1 NA, NHM, inv. 5604, p. 13.

In line with their increasing banking activities the hiring pattern of the NHM changed from 1890, and more applicants with degrees from commercial schools were hired. Between 1895 and 1940, 65 per cent of new staff held a degree from a commercial day school. The dominance of commercial school graduates at the NHM branches remained constant until the end of the 1920s. In the eyes of the directors the commercial schools clearly provided a better preparation for the NHM than other types of education. The more complex nature of dealings may have caused the firm to value formal schooling over on-the-job training.[1] After 1930 the share of commercial graduates dropped. This was caused by the increased competition between commercial schools and a the HBS5-A: a reformed version of the HBS5 that focussed less on exact courses and more on languages and economics. Because these schools were more generously funded by the government than commercial schools, many municipalities decided to transform their commercial school into a HBS5-A.[2]

Table 4.6: Mean work experience of NHM staff before being hired (months).

	1860-89	1890-99	1900-09	1910-19	1920-29	1930-45
Higher education	-	-	-	-	2	9
Higher commercial school	-	-	-	11	6	25
Commercial school	46	23	25	16	11	21
HBS5	-	35	38	31	19	31
HBS3	-	-	80	50	32	108
Elementary school	-	-	-	69	81	100
Not recorded	44	47	69	-	-	-

Notes: HBS5 includes HBS5-A students from 1920.
Sources: see Table 4.5.

Next to the fact that a commercial degree highly increased chances of being hired, they were ahead in other aspects as well. Table 4.6 shows that a commercial degree was the fastest route to obtain a position at the NHM. Staff without a commercial degree had to compensate for their lack of a commercial skills obtained in school by acquiring commercial skills through working experience. HBS5 pupils on average had worked for more than one year extra. HBS3 stu-

1 Cf. Heller, London clerical workers, p. 133.
2 Mandemakers, HBS en gymnasium, pp. 77-9.

dents even had three years more working experience before being hired. That those without a suitable education had to compensate with working experience may not have been exclusive to The Netherlands. Murphy recently argued that also The Bank of England hired experienced staff in the absence of commercial schooling.[1] The benefits of a commercial degree for obtaining a position at the NHM further corroborates with the findings from the HSN dataset, which suggested that the HBS3 may have sufficed for medium-skilled positions but less so for high-skilled white-collar jobs.

Since commercial schools substituted for working experience, staff with a commercial degree was significantly younger when offered a position in one of the colonial branches.[2] Commercial school pupils were around 21.5 years when employed, compared to 22.5 and 23.5 for HBS5 and HBS3 graduates respectively. As commercial day school length was the same as a HBS5, these differences cannot be explained by longer time spent in school. Only staff who had attended higher (commercial) education beat business graduates in the limited months of working experience.[3]

Real wages paid to these new employees can be used to proxy for supply and demand of skilled white-collar workers at entering the labour market.[4] For instance, high schools in the United States ensured the provision of white collar workers from the beginning of the twentieth century, resulting in a declining return to secondary schooling.[5] It is conceivable that the NHM paid higher wages to attract skilled workers when they were in short supply and vice versa. To make the wages comparable only wages of new employees aged 22 and under are considered.[6] Real wages were calculated using a cost of living index from Vermaas and Statistic Netherlands (CBS).[7] Figure 4.1 gives

1 Murphy, ''Writes a fair hand", p. 32.
2 $t(259) = 5.21$, $p < .001$
3 The only other employee with lesser working experience after 1920 was a graduate from the 'sugar school' of Amsterdam, which prepared for a chemistry position in the sugar industry. This employee, however, was fired after one year because of insufficient skills.
4 Seltzer and Simons, 'Salaries and career opportunities', p. 206; Seltzer, 'Internal labour markets', p. 251; Heller, London clerical workers, p. 90.
5 Goldin and Katz, The race between education and technology, pp. 76-85.
6 The standard deviations of real wage and age within this group are constant over the periods.
7 Vermaas, 'Real industrial wages', Appendix Table A.8 ('budget 1910' series). Costs of living index for the period 1913-25 from Statistics Netherlands "Consumentenprijzen; prijsindex 1900", available at http://statline.cbs.nl (accessed May 27, 2015).

the real monthly wages of new employees of the NHM.

Between 1861 and 1905 real wages for new employees increased by as much as 58 per cent. This seems in line with the contemporary complaints on the lack of suitable clerks. From 1905 real earnings started to decrease structurally until 1940. The period 1916-20 is probably an outlier because the hyperinflation caused by World War I was corrected relatively late. Nevertheless, even when this was resolved by 1921 real wages were almost twenty per cent lower compared to 1910. Even when the NHM hired a large number of new employees around the 1920s they did not have to pay higher wages to attract these workers. Moreover, there appears to have been no wage-effect of World War I. De Graaf notes that the NHM redirected its trade routes to circumvent naval blockades, and that Dutch banking even flourished in this period.[1] The profits of the NHM as a result continued to increase during the war, and only dropped after the crash of 1929.[2]

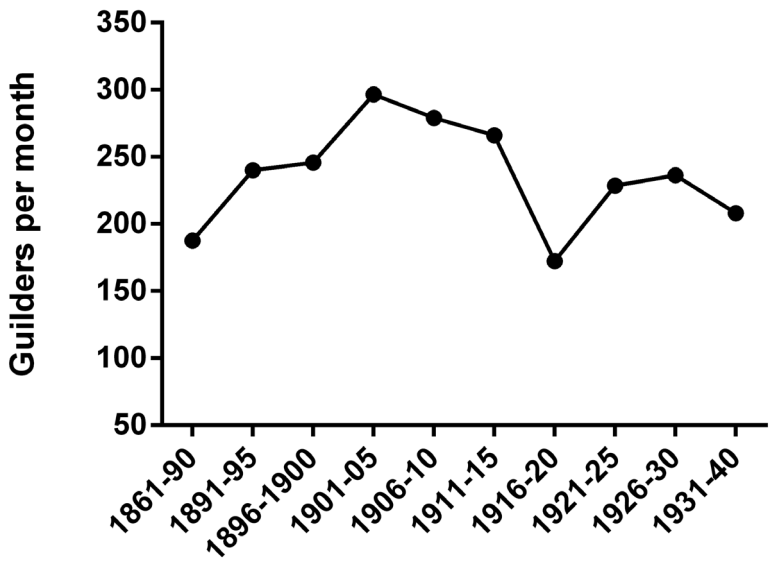

Figure 4.1: Average real wages of new employees of the NHM.

Sources: see Table 4.5.

1 De Graaf, Voor handel en maatschappij, pp. 199-201.
2 De Graaf, Voor handel en maatschappij, pp. 535, 538, 541.

If the trend in real wages can be taken as representative, it implies that the undersupply of skilled white-collar workers was indeed resolved after 1910 and perhaps even earlier. It might not be a coincidence that the decline in real wages coincided with a vast growth in commercial school attendance. After 1920 these pupils experienced even further competition from HBS5-A pupils. Due to increased attendance the NHM had much more pupils to choose from, and it is likely that this pushed wages down, just as an undersupply had pushed up wages before. That the undersupply of skilled workers was resolved somewhere between 1910 and 1920 is further suggested by the differences in real wages between commercial pupils and other new employees. Until 1910 the former group received significantly higher real starting wages on average, sometimes as much as sixteen per cent.[1] Between 1910 and 1940 the NHM, however, no longer paid a premium for commercial school pupils.[2]

Training low-skilled white-collar workers

Where the combination of HBS and especially commercial schools ensured sufficient skilled white-collar workers from about 1910, these schools did not supply sufficient workers to the lower segment of this labour market. Since these functions were relatively easy, such as typists, tellers, or cashiers, many of these tasks could have been learned on-the-job after completing elementary education. However, Goldin and Katz have demonstrated that in the United States the average white-collar worker even in the face of deskilling still needed 'some modicum of education'.[3] In the United States high schools provided this, while Heller argued that in London private commercial courses replaced on-the-job training.[4]

Staff registers from two Amsterdam institutions are used to examine how lower-level clerks were recruited and promoted within the office, and how much they were paid. These data are from the *Bank van Lening* (from the period 1863-1919) and the *Associatie Cassa* (from the period 1880-1914). The *Bank van Lening* was the municipal Amsterdam pawnshop where people could pawn their belongings for a period of time in return for a sum of money, and reclaim their possessions by redeeming this sum plus interest. Its clerks had to be knowledgeable on assessing value, calculating interest rates based on risk and value,

1 $t(79) = 6.44$, $p < .001$. This difference is also apparent in nominal wages.
2 $t(139) = -0.621$, $p > .05$
3 Goldin and Katz, The race between education and technology, pp. 64-72, 174.
4 Heller, London clerical workers, pp. 159-64.

cash dealings, and handling the accounts. The *Associatie Cassa*, also based in Amsterdam, was the cities' largest cashier firm. Its operations concerned cash management for merchant bankers in return for commission. This could vary anywhere between simply keeping and recording cash flows, to discounting, bill transactions, interest payments, and providing short-term loans backed by securities (*prolongatie*).[1]

In both firms starting clerks performed tasks and skills that can be seen as rather typical for low skilled white-collar workers. The occupational titles used by both firms are comparable, such as 'office clerk', 'assistant', and 'young employee'.[2] That they were relatively low skilled can also be inferred from their past working experience and the age when hired. The *Associatie Cassa* register incidentally gives the working experience of new clerks. Although these were hired at an average age of 23 almost none of them had past functions exceeding those of ordinary clerks or messengers. Others even came from completely different industries such as the crafts, sailing, or diamond cutting. The *Bank van Lening* throughout the period hired new employees at the age of fifteen, which means that they had little working experience and could not have completed secondary education.

Wages of different age groups are compared between 1863 and 1920 to see if there may have been a bottleneck in the provision of low skilled clerks. The wages of both institutions could be combined because there was no significant difference between the two firms in average wages paid to workers aged 18 to 30 during the different periods.[3] Tenure length did not affect wages independently because both firms hired most employees around the same age.[4] Average age of new staff did not change over the period. At both firms staff of the same age received a very comparable wage, even though at the *Bank van Lening* they had entered the firm younger. The real average annual wages of these clerks between the ages of 18 and 30 are given in Figure 4.2.[5]

1 Jonker, Merchants, bankers, middlemen, pp. 90, 243-4.
2 The Bank van Lening employed some women in this period, but too few to draw conclusions from. The Associatie Cassa did not list occupational titles other than the first one.
3 $t(5) = 0.74$, $p > .05$. Also the standard deviation of wages within this age group was constant over the period.
4 Pearson correlation between age and tenure at Bank van Lening: $r(1{,}007) = .95$, $p < .01$; Associatie Cassa: $r(693) = 0.86$, $p < .01$.
5 Real wages for older age groups were also collected but are not reported here, because it is more difficult to infer if these clerks were low or high-skilled. They are included in the Appendix, Figure A4.1. Also in older age groups real wage growth was most pronounced between 1863 and c. 1905, although senior clerks may have come at a relative premium.

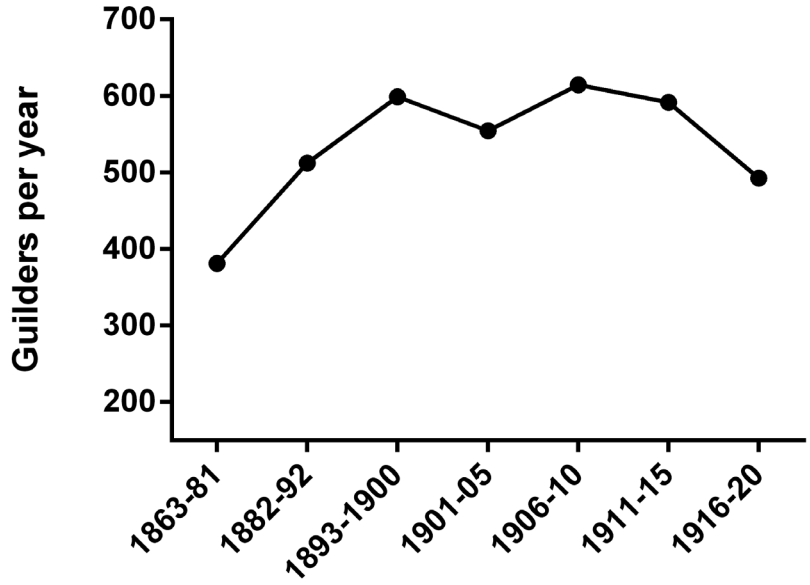

Figure 4.2: Average real wages of Amsterdam clerks between the ages of 18-30 at the Bank van Lening and the Associatie Cassa.

Notes: For calculation into real wages see text at Figure 4.1. Weekly wages were converted into annual wages assuming 275 working days annually, following Smits, Horlings, and van Zanden, Dutch GNP and its components, p. 20. The trend is not affected by variation in the mean age of employees (correlation between average age and wage: $r(7) = 0.53, p > .05$).
Sources: Stadsarchief Amsterdam (SAA), Archief van de Bank van Leening: tweede aanvulling, inv. 42; SAA, Archief Associatie Cassa, inv. 93. I am obliged to the Kas Bank N.V. for granting access to the archives of the Associatie Cassa.

The wages suggest that low skilled white-collar workers were in short supply until the turn of the century. Real wages sharply increased until 1900. It seems that both firms had to increase wages to attract workers. Many of these new workers had to be lured from other sectors, perhaps because the supply of white-collar workers was still limited. At the *Associatie Cassa* more than half of all new employees before 1891 were recruited from other occupational groups. These new employees had for example been working as carpenters, type founders, bakers or sailors. Again, this resembles the hiring pattern of The Bank of

England, where also a large share of workers had to be recruited from other occupational groups simply because the supply of clerks was still limited.[1] However, when the supply of Dutch white-collar workers caught up from the end of the century this practice decreased. From now on onwards 75 per cent of new employees were recruited from within the sector of white-collar workers. Real wages stabilized around the same period, which suggests that the supply of white-collar workers had increased.

Further indicative of an undersupply before 1900 were relatively high rates of turnover. It proved difficult to retain employees. At the *Associatie Cassa* the share of voluntary resignations to newly hired staff was about twenty per cent until 1900. Although their subsequent jobs are rarely given, at least in one case a clerk resigned to go work at another bank in 1894. Frederik Hendrik Nicolet, for example, had worked for the *Bank van Lening* and another firm before joining the *Associatie Cassa* in 1900.[2] Also at the *Bank van Lening* turnover increased, although here only from 1893. Many of their employees moved into civil service functions at the Amsterdam municipality. This contrast to The Bank of England, which used an internal labour market to retain staff when there were in short supply.[3] Although in both Amsterdam firms wages constantly increased during tenure and there was generally a single port of entry, this apparently did not suffice to retain staff in times of increasing demand.

Between 1901 and 1905 wages dropped, but a structural decline only set in after 1910. In 1920 wages of low-skilled clerks were even lower than at the end of the nineteenth century. In comparison, real wages of Dutch industrial workers doubled between 1850 and 1913.[4] Employers apparently did not need to raise clerical wages to the same degree. Based on these wages it appears that also for low skilled clerks the perceived undersupply had gone by 1910, and perhaps even earlier. There are further signs that the labour market for low skilled white-collar workers had become more loose around 1910. At both firms turnover markedly decreased, indicating that opportunities for clerks were relatively limited compared to the preceding decades. At both institutions tenure length for young employees increased as well, once more demonstrating that employees were not as keen to leave as before.

The cause of this change around 1905/10 was probably an increased supply of adolescents at the lower segment of the labour market. These were probably also better prepared for white-collar work than before. For instance, young staff

1 Murphy, ''Writes a fair hand", pp. 31, 33.
2 SAA, Archief Associatie Cassa, inv. 93, fol. 311.
3 Murphy, ''Writes a fair hand", p. 41.
4 Vermaas, 'Real industrial wages', p. 148.

was promoted quicker. The average age of 'assistants', an entry-level function at the *Bank van Lening*, dropped from eighteen before 1905 to about sixteen afterwards. Moreover, before 1904 starting clerks at the bank were explicitly listed as 'trainees' or 'pupils'. From 1904 onwards the terms 'trainee' and 'pupil' disappeared completely from the ledger. All clerks now began as 'assistants'. This function had earlier followed only after the training period, suggesting that they had picked-up entry-level skills somewhere else. A possible explanation for both developments is that the educational attainment of adolescents had increased.

Although both firm registers do not give the education level of their employees, it is likely that the growth in part-time commercial education, and its increasing affordability, provided more and more white-collar adolescents after 1910. From the beginning of the twentieth century commercial evening schools were established. These schools were specifically founded to enable children from the age of thirteen who did not have the means to attend day education to further skill themselves after work, for anywhere between three to five years.[1] In general subjects taught included a combination of bookkeeping, business correspondence in different languages, geography, shorthand and typewriting. As already explained, these schools were by and large provided and funded by municipalities, who apparently recognized a great demand for this type of schooling.[2]

Low tuition stimulated attendance of these schools. In 1911 average tuition per school year was 6.50 *guilders*.[3] As this was less than an unskilled workers' weekly wage commercial evening schools were relatively affordable.[4] Another advantage of evening education was that a clerk could increase his skills after work while earning a living at the same time. That this may indeed have been quite common is already suggested in the earlier mentioned report on clerical working conditions from 1903. There it was stated that part-time commercial courses provided the only route for lower skilled clerks to move upwards within the office, as employers rarely provided training themselves.[5] The commentator nevertheless also noticed that the number of part-time commercial courses was still quite limited.

This had drastically changed two decades later. By 1925 the number of commercial evening schools had increased to 120 with almost 14,000 pupils (ma-

1 Hoksbergen, Ons handels(avond)onderwijs, pp. 16-18.
2 Hoksbergen, Ons handels(avond)onderwijs, p. 19.
3 Verslag Onderwijs (1911).
4 De Economist 70 (1921), 212.
5 De toestand der handels- en kantoorbedienden te Amsterdam, vol. I, pp. 27-8.

le and female), overshadowing commercial day school and HBS3 attendance (3,971 and 2,913 pupils respectively).[1] Demand for commercial certificates grew as well. Already from the end of the nineteenth century clerks sought to distinguish themselves by passing the state bookkeeping exam. This exam was installed as a teachers' certificate, but was used more and more by clerks searching credentials for their work. By 1908 more than 450 applications were recorded compared to only 62 in 1882.[2] The number of commercial certificates awarded by the business society 'Mercurius' increased from 43 in 1889 to no less than 6,560 in 1920.[3] At the same time private tutors also discovered demand for commercial training. The number of tutors offering private bookkeeping in the *Algemeen Dagblad* peaked between 1900 and 1910. After that their number declined, probably because they were undercut by the cheaper commercial evening schools. For instance, one Amsterdam bookkeeping teacher charged as much as fl. 1.25 an hour; about one-fifth of annual commercial evening school tuition.[4]

As attending part-time commercial education provided a relatively inexpensive route towards clerical work, the supply of low-skilled clerks increased. In 1930 the Dutch census listed around 36,000 white-collar workers aged between fourteen and nineteen. In the same year evening school attendance was 13,966 (male and female), meaning that approximately one in three white-collar workers in this age group had visited a commercial evening school.[5] Commercial evening education as a result was one of the few successful attempts to offer post-elementary education to lower and middling classes before day secondary education became affordable for the masses before World War II.[6] For instance, already five years after the establishment of commercial evening school in Alkmaar (1909) almost half of all nineteen-year-old white-collar workers held a commercial degree.[7]

This swift growth in public and private part-time commercial education possibly explains why wages of Amsterdam clerks declined, and why they were less

1 Verslag Onderwijs (1925).
2 Elzinga, Geschiedkundig overzicht der examens.
3 Duijvendak and Van Ophem, Van kantoorklerk tot secretaresse, p. 148.
4 Algemeen Handelsblad, March 1, 1902.
5 Hoksbergen, Ons handels(avond)onderwijs, p. 17. Census available at www.volkstellingen.nl (accessed May 29, 2014).
6 Boekholt and De Booy, Geschiedenis van de school, p. 269.
7 This can be observed in the militia registers for Alkmaar of 1915-17, which list the occupation and education level of all nineteen-year-olds annually. I am obliged to the Noord-Hollands Archief for providing the digitized militia registers.

keen to switch jobs. Increased competition at the same time meant that holding a commercial degree was more and more important for securing a white-collar position. It is hard to conceive that more complex clerical skills explain this development. For employers commercial evening schools were advantageous as well, as they made screening of applicants easier and shifted the coordination of clerical training from on-the-job training to commercial schools. A side-effect of this development may have been was that bettering your position as clerk without a commercial education became increasingly difficult, in turn reinforcing attendance levels and the need to have commercial certificates to demonstrate skills.[1]

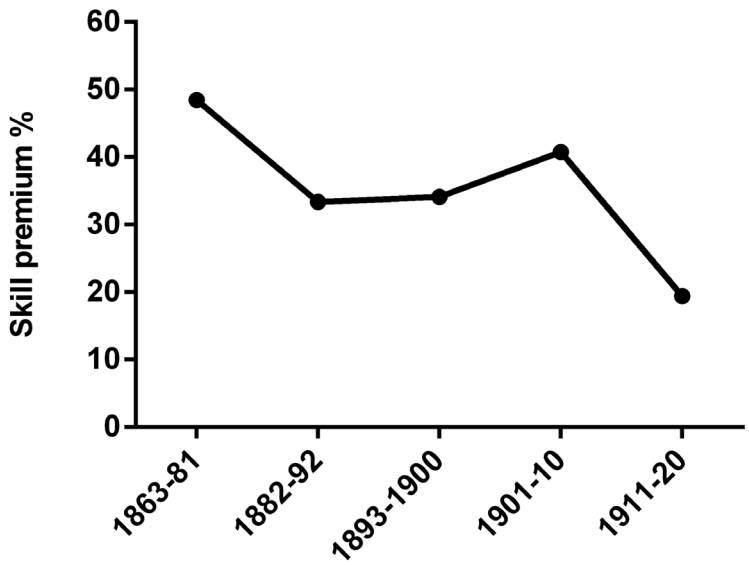

Figure 4.3: Wage premium of Amsterdam clerks aged 18-30 versus unskilled industrial workers.

Notes: The skill premium is based on nominal daily wages. Annual wages were again converted assuming 275 working days annually.
Sources: Clerical wages from Figure 4.2. Industrial wages from Vermaas, 'Real industrial wages', Appendix Table A.8, pp. 234-5.

1 Cf. Stovel, Savage, and Bearman, 'Ascription into Achievement', p. 374.

Estimating the skill premium for clerical work further demonstrates that the relative returns for low skilled white-collar work were decreasing from the second decade of the twentieth century, very likely because of these developments. The wage premium between clerks and industrial workers signifies if employers were willing to pay more for white-collar workers. It can therefore be seen as a skill premium for clerical work.[1] Figure 4.3 shows how much clerks from the *Bank van Lening* and the *Associatie Cassa* earned relative to industrial workers. The latter group performed unskilled work, so the premium can also be regarded as a crude return to having entry-level commercial skills.

Relative returns to low-skilled white-collar work were especially high until 1882. From the end of the century industrial wages increased faster than white-collar wages, causing the skill premium to decline from 48 to 33 per cent. It is conceivable that in this period of industrialisation more unskilled workers were needed than white-collar workers. Until 1910 demand for both may have progressed at a comparable levels, resulting in a fairly stable skill premium. After 1910, however, the skill premium for clerical work plummeted again, even while the number of clerical workers had increased quite substantially compared to 1909. Surprisingly, this suggests that it proved easier to supply low-skilled clerical workers than unskilled industrial workers. Perhaps many adolescents chose a relatively affordable commercial education over unskilled production work, as a result of which supply exceeded demand.

The trend of the Dutch clerical skill premium resembles that of the United States. The ratio of male clerical earnings to production workers here dropped from 1.69 in 1895 to 1.09 in 1923, with a pronounced decline taking place especially between 1909/14 and 1919 (1.65 to 1.20).[2] According to Goldin and Katz, this substantial decline should be ascribed to the increase in high school enrolment, which 'served to flood the labor market with literate and numerate workers whose skills enabled them to move into white-collar office jobs'.[3] Seeing the impressive increase in especially part-time commercial education occurring in the Netherlands exactly when the skill premium declined, it may well be that this explanation holds for the Netherlands as well.

1 Goldin and Katz, The race between education and technology, pp. 63-7.
2 Goldin and Katz, The race between education and technology, p. 66.
3 Goldin and Katz, The race between education and technology, pp. 71-2.

Conclusion

Between 1860 and 1920 the Dutch education system gradually adapted to a growing demand for white-collar workers. The HBS5 and HBS3 installed in 1863 did not provide a sufficient number of white-collar workers, primarily because the attractiveness of the HBS3 remained limited and many HBS5 pupils entered the professions through university. As a result real wages for skilled clerks at the *Nederlandsche Handel-Maatschappij* continued to increase until the provision of skilled white-collar workers was put on a more stable footing through the emergence of municipally funded commercial schools. Contrary to general opinion in Dutch education history, these wages demonstrate a demand for commercial schooling in the Netherlands.[1] The NHM, as one of the biggest national trading and banking companies, showed a clear preference for these pupils and also education reports demonstrate that attending these schools significantly increased access to skilled white-collar work. The massive growth of its attendance levels eventually caused wages to decline. A very similar development likely occurred at the lower segment of the white-collar labour market, where part-time commercial schools supplied more and more lower-skilled white-collar workers. Increasing real wages suggest an undersupply of lower-skilled white-collar workers until about 1905 or 1910. Because these schools quickly became relatively affordable attendance levels increased, possibly speeding the decline of the wage premium for lower-skilled white-collar workers.

A very similar development has been outlined for the United States, where increased education provision caused white-collar wages to stagnate and their skill premium to drop substantially between 1909 and 1920. In contrast to the United States the Dutch labour market may have been somewhat more segmented, but for both segments specific schools were established to battle the shortage of white-collar workers. Both in the Netherlands and the United States crucial steps to adapt education provision towards providing more white-collar workers were taken at the local, or municipal, level.[2] Only after municipalities had recognized a demand for more full and part-time commercial education and acted accordingly did the government slowly began to increase public funding. It was only after 1920 that the government realized there was indeed need for commercially-oriented secondary education, resulting in the incorporation of commercial schools into the HBS5-A. This development seems to fit within a broader literature arguing for the effective-

1 For this literature see Mandemakers, HBS en gymnasium, 76-7.
2 Goldin, 'The human-capital century'.

ness of educational adaptation instigated at the local level.[1]

A next step would be to examine how exactly countries besides the Netherlands and the United States adapted their education system to demand for clerical personnel. For instance, it would be interesting to see if the link between attendance levels and wages also holds for England, where clerks experienced declining wages between 1880 and 1920 as well.[2] Seeing the tradition of local authority that existed in both countries, this process of institutional adaptation may have followed a different trajectory in countries with a stronger centralized government such as England or France, perhaps leading to more private than public funding of education.[3]

1 Lindert, Growing public; Beadie, 'Education, social capital'; Herbst, 'Nineteenth-century schools between community and state'; Savoie, "The role of cities in the history of schooling."

2 Seltzer, 'Salaries and promotion opportunities'. Cf. Heller and Kamleitner, 'Salaries and promotion opportunities'; Heller, 'Work, income and stability'.

3 Reeder, 'The reconstruction of secondary education'; Heller, London clerical workers, ch. 7.

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Appendix

Table A4.1: Binary logistic regression for variables predicting probability of obtaining an low-skilled white-collar position for the sample of HBS3 and commercial school pupils, with marginal effects.

Predictor	Coefficient	SE	*p*	Marginal effect	SE	*p*
Type of degree						
HBS3 degree	0.924	0.575	.108	0.046	0.033	.168
Commercial degree	0.520	0.578	.369	0.030	0.036	.404
Period						
1901-1910	-0.329	0.786	.675	-0.014	0.034	.687
1911-1920	-0.125	0.690	.856	-0.005	0.026	.855
1921-1935	-0.358	0.651	.583	-0.015	0.026	.565
Constant	2.694	0.594	.000			
X^2	3.06					
Pseudo R^2	0.016					
Observations	499					

Notes: Dependent variable is an low-skilled white-collar occupation, coded 1 if the occupation was classified under HISCO groups two through four, and the HISCLASS skill level was low. Reference category for type of degree is *drop-out*. Reference for period is *1860-1900*.
Sources: see Table 4.3.

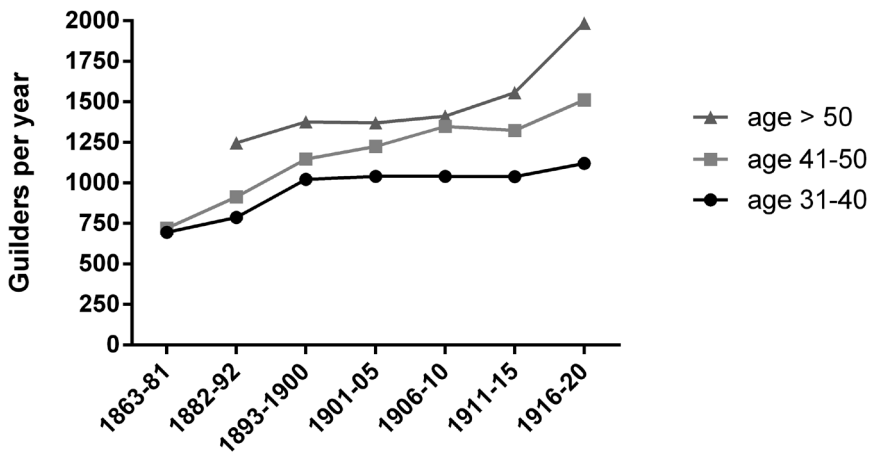

Figure A4.1: Average real wages of Amsterdam clerks for different age groups at the Bank van Lening and the Associatie Cassa.

Notes: For calculation into real wages see text at Figure 4.1. Weekly wages were converted into annual wages assuming 275 working days annually, following Smits, Horlings, and van Zanden, Dutch GNP and its components, p. 20. The trend is not affected by variation in the ages of employees, as the mean age and standard deviations are constant within age groups over the periods.
Sources: See Figure 4.2.

Chapter 5. The power of the purse: student funding and the labour market for Dutch Reformed and Catholic theology students, 1800-1880

Abstract: Several European countries were unable to match student numbers with labour market demand during the nineteenth century. The causes of this mismatch may be found in the organisation of higher education and the funding of students. Drawing on a variety of sources, this paper compares financial support available to Reformed and Catholic theology students in The Netherlands, to examine how differences in student funding affected enrolment and labour-market patterns. While low tuition fees increased access to the public universities, generous student financing provided by numerous parties caused a structural oversupply of Protestant theology students. The private Catholic colleges instead selected students and applied grants specifically to encourage graduation, consequently balancing students more closely with labour-market demand. This relative success of regional colleges over national universities mirrors the primary education history literature on the benefits of local coordination and resource allocation.

Keywords: higher education, student financing, labour market, theology, history

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Introduction

While acknowledging the importance of an education populace, Adam Smith already struggled with how societies should fund education. Because of the perceived public benefits such as lower inequality and economic growth, education could be paid for with public money, but it could also be paid for by those individuals who most directly benefit from it.[1] Following Smith, historians have demonstrated that the funding of education indeed mattered for attendance levels. For primary education, local distribution of funds explains rising enrolment levels in nineteenth-century Europe and the United States.[2] By organising education on a regional or city level, demand could be translated into increased funding, consequently lowering tuition fees and increasing enrolment.[3] Also in the Netherlands funds assigned by cities allowed rising primary school enrolments during the nineteenth century, as local authorities could identify how many schools were needed, and adapted tuition fee policies to increase attendance.[4]

It is not clear if this 'local funding argument' also applied to post-primary education. Contrary to primary education, enrolment here to a larger degree needed to be balanced with labour-market demand.[5] Increased access could cause an oversupply of skilled workers, rising unemployment levels, and even social unrest.[6] Lowering access through increasing tuition fees might cause labour-market shortages and reduce chances for social mobility. Matching access to post-primary education with labour-market demand during the nineteenth century and before proved challenging.[7] England may have lost economic prowess because the absence of a 'local state apparatus' delayed the supply of technical schooling.[8] Both in France and in Germany cycles of graduates flooded the labour market.[9] In the Netherlands it proved difficult to control the supply of

1 Smith, Wealth of nations, pp. *620-42*.
2 Lindert, Growing public; Goldin, 'The human-capital century'; Westberg, 'Stimulus or impediment?'; Beadie, 'Education, social capital and state formation'.
3 Goldin and Katz, 'The "virtues" of the past'.
4 Knippenberg, Deelname aan het lager onderwijs in Nederland.
5 Anderson, 'The idea of the secondary school', p. 106.
6 O'Boyle, 'The problem of an excess of educated men'; Ringer, Education and society in modern Europe, pp. 2, 50-1; Goldin and Katz, The race between education and technology, p. 304.
7 Frijhoff, 'De arbeidsmarkt voor academici tijdens de Republiek', p. 503.
8 Green, 'Technical education and state formation', p. 138; Sanderson, Education and economic decline in Britain.
9 Ringer, 'Admission', pp. 234-5; Kaelbe, Social mobility in the 19th and 20th

medicine and theology graduates, leading to an oversupply on the labour market.[1]

This imbalance between access to higher education and labour-market demand may have related to the financing of study costs.[2] The undersupply of English nineteenth-century engineers may have been caused by the high costs of attending higher education.[3] In France, the government proved unable to use grants in order to reduce the excess of medicine graduates.[4] Access to Dutch universities has incidentally been linked to grants and tuition fees as well.[5] Many contemporaries also related the supply of European graduates to the costs of attending university.[6] Even though Smith has already argued that an excess supply of grants 'draw many more people into those trades than could otherwise pretend to follow them', there is an absence of studies examining the link between student financing and attendance levels.[7] Consequently, it remains unknown how the funding of students affected the balance between access to higher education and labour-market demand.[8]

By taking a case-study approach this paper explores how differences in student funding affected access to higher education and labour-market patterns. From about 1800 Dutch Reformed (Protestant) and Catholic theology students were educated in centralised public and regional private institutions respectively. Albeit particular, this presents a rare opportunity to compare a similar education under a dissimilar institutional setting. Both institutions educated for a comparable occupation, and both labour markets converged in size during the century. As each Church employed around 1,500 ecclesiastics around the 1860s their labour markets were sizeable, even exceeding that of physicians.[9] This is not surprising since together both Churches had to minister to almost

centuries, pp. 59, 61; Jarausch, 'The social transformation of the university', p. 615.

1 Van Rooden, Religieuze regimes, chapter. 2; Van der Velden, 'Overvloed en schaarste'.

2 Jarausch, 'The social transformation of the university', pp. 613-14; Ringer, 'Admission', p. 234; Jarausch, 'Higher education and social change', pp. 17-18, 35-6; Edirisooriya, 'A market analysis'.

3 Guagnini, 'Worlds apart', p. 16.

4 Weisz, 'The politics of medical professionalization'.

5 Roelevink, Gedicteerd verleden; Caljé, Student, universiteit en samenleving, pp. 334–6.

6 O'Boyle, 'The problem of an excess of educated men', pp. 478, 485-6, 491.

7 Smith, Wealth of nations, pp. 112-13.

8 See also the special section on education markets in Social Science History 32:1 (2008).

9 Van der Velden, 'Overvloed en schaarste', p. 29.

the entire population. In 1849, 55% of the Dutch population was Reformed and 38% Catholic.[1]

After introducing both education institutions, the paper will demonstrate that the differences in funding between Reformed and Catholic students affected enrolment and labour- market patterns significantly. A multitude of actors involved caused the emergence of a 'free market' for grants, preventing the formulation of a student financing policy tailored to job market needs, but the numerous grants awarded did increase access. Keeping grants and tuition fee policies in the same hands on a regional level, together with close ties between colleges and the labour market, ensured a closer match between supply and demand for Catholic theology graduates.

Educating Reformed vicars and Catholic priests

In 1815 the newly installed Dutch government introduced a decree to regulate the Dutch universities, which hitherto had been urban institutions.[2] Several universities were closed and only the universities of Utrecht, Leiden and Groningen remained, together with some athenaeums.[3] Although it had been common practice before, becoming a vicar in the Dutch Reformed Church now required a university degree in theology.[4] 1 Passing an entry exam or certification from a Latin school or gymnasium was required to be admitted to university. Everyone passing this entrance exam or having a certification had to be accepted to university. The decree further stipulated an official course of study for theology students, beginning with four years at the arts faculty and being completed with two years at the faculty of theology. This study trajectory remained largely the same for the remainder of the century.[5] After obtaining a university degree of *candidaat* in theology graduates could take a vicar's exam at the Reformed Church to qualify as a vicar. Most graduates seem to have taken their

1 Centraal Bureau voor de Statistiek, 'Kerkelijke gezindte en kerkbezoek vanaf 1849', http://statline.cbs.nl/ StatWeb/ publication/?VW=T&DM=SLNL&PA=37944&LA=NL (accessed November 19, 2014) .

2 Organiek Besluit, August 2, 1815. Printed in Bijvoegsel tot de Nederlandsche Staats-Courant 242 and 243 (1815).

3 Athenaeums were comparable to universities but could not grant degrees.

4 The decree made this mandatory for aspiring vicars of the Reformed Church only; for other Protestant denominations like Lutheranism and the Walloon Church no qualifications were yet put in place; Organiek Besluit, articles 117, 118.

5 De Lange, '"Staatsrechtelijk geknutsel"'.

vicar's exam between the ages of 23 and 25.[1]

Vicar's exams had to be taken at a regional *classis*. The *classis* was a collection of about 20 local church boards that also settled and regulated regional church affairs.[2] This regional focus typified the Dutch Reformed Church. Representatives of the *classis* together made up provincial church boards, whose representatives in turn constituted the general synod (*Algemeene Synode*), where general administration and finances were discussed and issues settled that could not be resolved locally. None of these bodies, however, was involved in managing theology faculties.

Before 1815 theology students had been exempt from paying tuition fees because of the relatively low social standing of these students and because training Reformed vicars was considered a necessity for the Reformed Dutch Republic.[3] The Revolt against Catholic Spain had made the Reformed Church de facto the only public religion, although freedom of religion was tolerated in private. With the official separation of Church and state after the Napoleonic period this privileged position had become untenable in theory. Now also theology students had to pay tuition fees.

Because Calvinism was the privileged confession during the early modern period, Dutch universities offered no training in Catholic theology. Catholic students wanting to study theology did so at foreign universities where Dutch colleges were set up for the purpose, for instance at Leuven or Cologne.[4] The proclamation of freedom of religion that caused the introduction of tuition fees for Reformed theology students after 1795 also allowed the establishment of Catholic training institutions within the Netherlands.[5] The full training course consisted of six years at a *kleinseminarie* or minor college that concentrated on philosophy, followed by four to six years at a *grootseminarie*, or major college, concentrating on theology.[6] Although legally not institutions of higher

1 Based on a sample of 50 theology graduates between 1813 and 1850; J. Vree; 'Lijst van (voornamelijk Hervormde en Lutherse) Predikanten, Hulppredikers, Kandidaten, Proponenten en Theologanten', available at www.hdc.vu.nl/nl/Images/DNK%20predikers_tcm99-120756.pdf (accessed June 6, 2015).

2 Van Rooden, Religieuze regimes, p. 175.

3 Wingens, 'The motives for creating institutions of higher education'.

4 Vregt, 'De vroegere collegiën of seminariën tot opleiding van geestelijken'; Rogier, Geschiedenis van het katholicisme, pp. 238, 383.

5 Clemens, 'Een onbedoeld kind van de revolutie'; Jacobs, '"De opgang"', p. 15; Broeyer, 'De predikantsopleiding in de negentiende eeuw', p. 78.

6 The major colleges of Haarlem and Den Bosch typically required six years of studying, and Utrecht only four. Time spent at each grand seminary seems to have depended on the distribution of philosophy classes over the small and grand

education, all major colleges provided post-secondary teaching. Most Catholic theology students received their ordination between the ages of 23 and 26.[1] On leaving major college students were ordained as priests and then became chaplains (assistant priest) in the college's church district.[2] Once a chaplain was deemed capable enough he could be promoted to parish priest. Although the government forced some small colleges to close between 1825 and 1830 because it wanted Catholics to attend Leuven university, it did not interfere much with teaching at the Catholic colleges during the rest of the nineteenth century.[3]

Major colleges were first founded in Breda and Den Bosch in 1798, followed a year later by major colleges at Warmond and Heerenberg, set up in the missionary area of the *Hollandsche Missie* (Figure 5.1).[4] The minor colleges of Hageveld and Culemborg prepared for the major colleges here. Heerenberg closed in 1841, leaving Warmond as the only major college in the north until 1856.[5] With the re-establishment of the Dutch bishopric in 1853, the major college of Rijsenburg opened in 1856 to train the clergy for the newly established district of Utrecht, and Warmond now trained for Haarlem only. The major college of Den Bosch provided the training of Den Bosch clergy throughout the nineteenth century.[6] Minor colleges in Beekvliet, Oudenbosch and Rolduc prepared for major colleges in the south.[7] The major college in the city of Roermond served the district of Roermond.

The organisation of the colleges, including finances, enrolment, and day-to-day operations were in the hands of the college directors. Also the individual Dutch Catholic Church districts (vicariates or dioceses) operated relatively independently from each other, without much interference from the Vatican and the archdiocese, and consequently also founded their colleges individually.[8] Jacobs has typified this absence of coordination between Dutch Catholic dis-

seminary; Jacobs, '"De opgang"', p. 5.

1 Diocesan archive of Den Bosch (DADB), inv. 492. These archives are no longer accessible because of cost reductions.

2 Priests trained by Catholic orders were rarely employed by the Dutch dioceses and are therefore left out of consideration.

3 Jacobs, '"De opgang"', p. 13. Only a couple of students eventually visited the philosophical college at Leuven; Handboekje voor de Zaken der Roomsch-katholijke Eeredienst (1848), p. 5.

4 Clemens, 'Een onbedoeld kind van de revolutie', pp. 320-3.

5 Rogier and De Rooy, In vrijheid herboren, p. 185.

6 Jacobs, '"De opgang"', pp. 10-11.

7 Jacobs, '"De opgang"', pp. 14-17.

8 Clemens, 'Een onbedoeld kind van de revolutie'.

tricts as 'diocesan particularism'.[1] As a result of this particularism the Catholic church districts individually founded training institutions and bore the costs.[2]

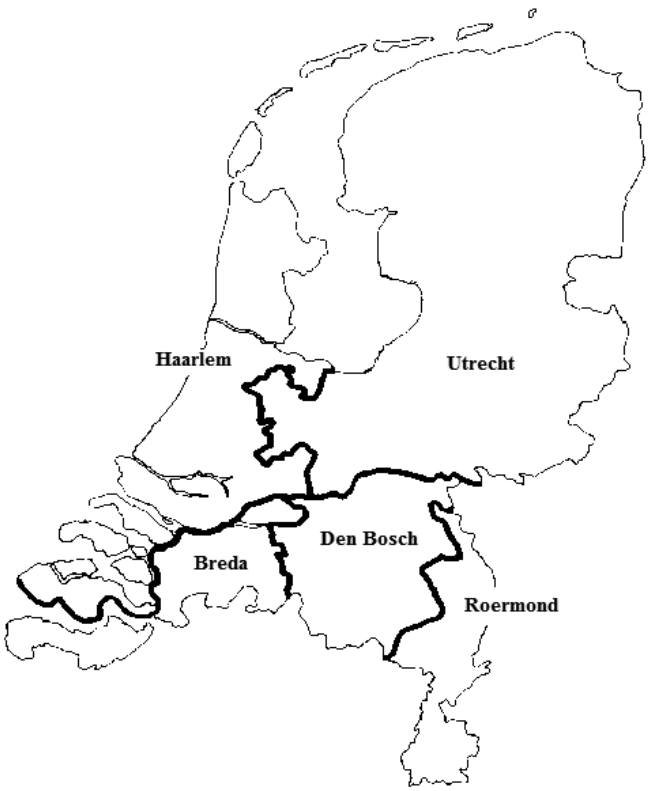

Figure 5.1: Dutch Catholic Church districts from 1853.

Notes: Haarlem and Utrecht together formed the *Hollandsche Missie* until 1853.
Source: Original image from Katholiek Documentatie Centrum, Nijmegen.

1 Jacobs, 'Van losse hulptroepen naar een welgeordend leger', p. 219; Rogier and De Rooy, In vrijheid herboren, pp. 203-4.
2 Few Dutch students attended the theology faculty of Leuven during the nineteenth century; Kenis, 'De theologische faculteit te Leuven', pp. 206-8, 221-4.

Financing Reformed theology students

The 1815 decree had raised study costs for Reformed theology students by requiring them to attend university for around six years with tuition fees of between 100 and 180 guilders a year.[1] However, studying theology was generally regarded as socially less prestigious than studying law or medicine, meaning that the elite traditionally refrained from studying theology.[2] Reformed theology was therefore by necessity one of the first types of higher education accessible for relatively lower social groups in order to ensure sufficient vicars.[3] As a result theology students had always come from relatively lower social classes than other students. Between 1801 and 1811 most public grants were already given to Reformed theology students, and many had resorted to grants during the seventeenth and eighteenth centuries as well.[4] The increase in tuition fees after 1815 consequently presented many of them with a financing problem.[5]

Although the Reformed Church was no longer the privileged church, its ties to the government remained close.[6] Thus, when the Reformed Church feared that the new tuition fees would present a problem for the future supply of vicars, it seemed natural to call upon the government to relieve the financial difficulties of theology students.[7] After examining student numbers the Reformed Church concluded in 1819 that high costs prevented students from enrolling in the arts and theology faculties at the three Dutch universities.[8] The Church therefore requested the government to allow more freedom in study choice and in particular asked to lower tuition fees and raise public study grants. The 1815 decree had already installed about 20 public grants for theology students set at 200

1 Otterspeer, De wiekslag van hun geest, pp. 430-1; Roelevink, Gedicteerd verleden, pp. 136-7.
2 Jarausch, 'Higher education and social change', pp. 25, 28, 30; Bos, Servants of the kingdom, pp. 180-3; Zoeteman-van Pelt, De studentenpopulatie van de Leidse universiteit, pp. 307-8; Caljé, Student, universiteit en samenleving, pp. 221, 336.
3 Ringer, 'Admission', pp. 250-1.
4 Dufour-Briet, De kerkelijke en maatschappelijke achtergronden; Handelingen van de Algemeene Synode der Christelijke Hervormde Kerk in het Koningrijk der Nederlanden (1819), p. 17 (hereafter Handelingen); Zoeteman-van Pelt, De studentenpopulatie, pp. 166-73.
5 Letterkundig Magazijn van Wetenschap, Kunst en Smaak (uittreksels en beoordelingen), no. 2 (1819), p. 78.
6 Bos, Servants of the kingdom, pp. 141-2.
7 Van Rooden, 'Van geestelijke stand naar beroepsgroep', pp. 370-1.
8 Handelingen (1819), pp. 16-44, 88-90.

or 300 guilders a year, to help talented but indigent students afford study costs.[1] According to the Church this was not sufficient. Since the seventeenth century, sons of vicars could also obtain an additional special allowance of 100 guilders a year, called academy money, and the Church asked for this allowance, which had fallen into disuse, to be reinstated and raised.

The multiple appeals by the Reformed Church were eventually successful and illustrative of the still close ties between the Reformed Church and the government. Almost all requests were granted in 1820.[2] Several theology courses were made optional instead of compulsory. Tuition fees for theology students were abolished completely. Although public grants were not raised, the university boards were given permission to let public grant students receive private grants of over 100 guilders as well, which had previously been prohibited. Last, the academy money was raised from 100 to 200 guilders per year and was awarded to all sons of vicars studying theology. As a result, study costs for theology students after 1820 dropped dramatically, notably for sons of vicars.

In 1836 the government reintroduced tuition fees and cut public grants because of budget cuts but also because there was no longer a shortage of vicars, followed by the abolition of all grants in 1842 due to further budget cuts.[3] A few were reinstalled in 1853. Despite these policy changes financial support did not disappear altogether. Various other sources of financial support remained open to Reformed students throughout the century, structurally easing access to the theology faculties.

First, sons of vicars opting to study theology continued to receive the special 200 guilders grant. Second, the government managed so-called vicariate funds, Catholic property confiscated during the Dutch Revolt, the yields of which were traditionally awarded as student grants to Reformed theology students.[4] In the nineteenth century they were supervised by the government. A sample of the records suggests that around 30% of these funds were still awarded to Reformed theology students during the nineteenth century, totalling about 4,000 guilders a year.[5] Third, in addition to the public funds many private grant

1 Organiek Besluit, article 214.

2 Koninklijk Besluit [Royal Decree], November 15, no. 29 (1820); Nationaal Archief (NA), The Hague, Hervormde Eredienst, inv. 1900.

3 Otterspeer, De wiekslag van hun geest, pp. 429-30; Kamerstuk Tweede Kamer 1837-1838, kamerstuknummer XXIII, ondernummer 2 (accessible through www.statengeneraaldigitaal.nl) (accessed August 7, 2014).

4 Rogier, Geschiedenis van het katholicisme, vol. I, pp. 531, 542, 569, 581.

5 Records of 1847-48 and 1871-72; NA, BiZa/Hoger Onderwijs, inv. 897, inv. 898; Kamerstuk Tweede Kamer 1850-1851, kamerstuknummer II, ondernummer 100.

foundations existed. Nearly all of these private foundations targeted Reformed theology students. Information drawn from various sources provide an estimate of the level and number of different grants. The results are given in Table 5.1, together with the number of Reformed theology students and the number of vicars' sons receiving academy money.

Table 5.1: Estimate of financial support for Reformed theology students.

Year	Private grants (fl.)	Public grants (fl.)	Vicariate funds (fl.)	Total (fl.)	Average grant (fl.)	Number of grants	Academy money grants	Total theology students	All grants/ students
1820	6,030	5,000	4,000	15,030	209	72	83	163	0.95
1830	9,300	5,000	4,000	18,300	191	96	208	561	0.54
1840	10,380	3,700	4,000	18,080	199	91	140	242	0.95
1850	10,760	0	4,000	14,760	152	97	114	323	0.65
1860	13,660	3,000	4,000	20,660	178	116	170	434	0.66
1870	13,290	3,000	4,000	20,290	165	123	116	283	0.84

Notes: Student numbers between 1815-1844 are estimated by multiplying the average length of study for theology students at Utrecht (1815-1849) and Leiden (1817-1832) with the number of annually passed vicar exams. Since dropping out was uncommon and job opportunities outside the Church limited, there is a strong correlation between the number of theology students at Utrecht and Leiden between 1817-1832 and passed vicar exams ($n = 16$, $r = 0.80$, sig. = <0.01). This measure includes theology students at athenaeums because these had to register at a university. Academy money for 1838-39, 1841-44, 1846, 1854-59, 1861-69 is interpolated, and 1870-77 is based on the share of total academy money received by the *classis* of Utrecht for the years 1847-52 and 1859.

Sources: Public grants and vicariate funds: see text. Private grants: NA, BiZa, 1813-1848, inv. 4836 (no. 52); NA, BiZa / OKW, inv. nos. 260 (no. 59), 548 (no. 55), 731 (no. 103), 732 (no. 163); Het Utrechts Archief (HUA), Universiteit Utrecht: faculteit Godgeleerdheid, inv. nos. 3, 707, 714, 715, 758, 767 through 779. Academy money: NA, Hervormde Eredienste, 1815-1870, inv. 1681, inv. 1736; *Kamerstuk Tweede Kamer 1850-1851*, kamerstuknummer XCVIII, ondernummer 4; *Kamerstuk Tweede Kamer 1853*, kamerstuknummer XV, ondernummer 2; *Kamerstuk Tweede Kamer 1853-1854*, kamerstuknummer LVII, ondernummer 3; HUA, Nederlandse hervormde classis Utrecht, inv. 138-141. Student numbers: for 1815-1819: *Handelingen* (1819). For 1820-1844: HUA, Archief Rijksuniversiteit Utrecht, senaat en rector, inv. 306, inv. 307; HUA, Universiteit Utrecht: faculteit Godgeleerdheid, inv. 304; Universiteit Leiden, Archief Senaat en Faculteiten, inv. 192 to 207; Universiteit Leiden, Archieven van de Faculteiten, inv. 20; *Nederlandse "alba studiosorum" en "promotorum"*. For 1845-70: Jensma and De Vries, *Veranderingen in het hoger onderwijs*, pp. 132-3. Vicar exams from *Handelingen* 1819-1857.

From 1820 to 1870 the number of available private and public grants rose from 72 to 123, with the result that, at certain times, almost every student could get one. For instance, if in 1840 sons of vicars did not receive grants other than the academy money, nearly all the remaining 102 students could have obtained a grant. Even when the grant/student ratio was at its lowest, for example around 1830, study grants averaging 191 guilders were still available for more than half of the student population. On top of that, around 40% of Reformed theology

students during the nineteenth century were sons of vicars and thus received an annual allowance of 200 guilders. These figures are probably an under bound estimate. During a debate on 11 December 1835, the member of parliament Willem Schimmelpenninck van der Oije put financial support for theology students at 400 guilders per student annually.[1] Although he may have been exaggerating because he argued for a restoration of tuition fees, anecdotal evidence in newspapers suggests that the number of private grants in particular could well have been higher.[2]

The number of grants matters less, in fact, than their impact on total study costs. Information from a number of account books allows study costs for theology students to be estimated. As it turns out study grants indeed covered a considerable share of the costs. Since consumption formed a large part of a students' expenses, a cost of living index is used to make a time-series of Reformed theology study costs. The index gives a relatively large weight to rent, another major expenditure of students. Figure 5.2 shows that study costs fell in line with overall prices after 1815. This decline lowered study costs by 25%, begging the question as to whether the 1820 abolition of tuition fees was really necessary to raise enrolment. Study costs between 1820 and 1836 totalled around 750 guilders per year. Although the reintroduction of tuition fees in 1836 temporarily raised study costs, this was offset by a further price fall around 1848. It appears that studying theology in Utrecht after 1820 rarely cost more than 800 guilders a year, which resembles study costs at the university of Groningen.[3]

Receiving one grant already lowered expenditure on private study costs by approximately 25%. Costs of living declined more than average grant amounts, so even while average grants became lower after 1840 their purchasing power increased. As Table 5.1 has demonstrated, more than half to nearly all theology students could have received a grant. In total, the grant market financed at least one-fifth of total study costs for theology students during the nineteenth century. Such levels of financial support were unknown to any other field of study. No evidence was found for grants for non-theology students in this period. Law or medicine students or their parents had to pay all study costs themselves, presumably making access to these studies much more difficult for middle to lower income groups.

Looking at the social origin of university students highlights the degree to which the widely available support broadened access and stimulated enrolment at the faculties of theology in particular. Otterspeer has suggested that that the large presence of middle-class students at theology faculties can only be ex-

1 Handelingen der Staten Generaal, December 11, 1832, p. 86.
2 For example in the Opregte Haarlemsche Courant of July 28, 1857.
3 Caljé, Student, universiteit en samenleving, pp. 332-3.

plained by 'a shadowy network of study grants and family support'.[1] Thus, in the absence of study grants and measures to reduce tuition fees, access to the other faculties at all three Dutch universities should have been predominantly reserved to students from higher social groups. Indeed, students at the law and medicine faculties at all three Dutch universities structurally originated from higher classes than theology students.[2] At the Leiden faculty of law almost 60% of students originated from the highest classes between 1815 and 1875, compared with only 10% at the faculty of theology.[3]

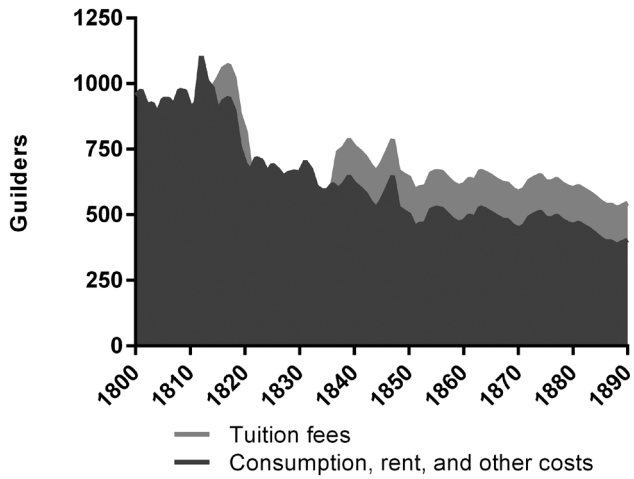

Figure 5.2: Real annual study costs for theology students at the university of Utrecht (estimate).

Notes: Average annual study costs minus tuition fees of Nicolaas Christiaan Kist (enrolled in 1811-15), and eleven theology students at the university of Utrecht (enrolled in 1874-77) are deflated with a consumer price index. Tuition fees are estimated at fl. 125 between 1815-1820 and fl. 140 between 1837-1890.
Sources: NA, Archief Familie Teding van Berkhout, inv. 2160; NA, Kist, inv. 149; HUA, Hervormd opleidingscentrum Ruimzicht te Doetinchem 584-1, inv. 268. Consumer Price Index: 'stylized derived elite index', available at www.iisg.nl/hpw/brannex.php (accessed July 28, 2014). Tuition fees: Otterspeer, De wiekslag van hun geest, pp. 431-2; Caljé, Student, universiteit en samenleving, pp. 332-3; Roelevink, Gedicteerd verleden, pp. 136-7.

1 Otterspeer, De wiekslag van hun geest, p. 432.
2 Wingelaar, Studeren in de negentiende eeuw, p. 69.
3 Otterspeer, De wiekslag van hun geest, p. 420.

Table 5.2: Occupation of fathers of all Utrecht theology students in 1825 and 1835.

Class	Description	N	%
High	HISCLASS 1 to 3	62	19
Middle	HISCLASS 4 to 7	81	24
Low	HISCLASS 8 to 12	8	2
Vicars	Vicars of the Dutch Reformed Church	93	28
Other	Unknown, widows, without employment, deceased	87	26
Total		331	100

Source: HUA, Universiteit Utrecht: faculteit Godgeleerdheid, inv. 294.

This dominance of middle groups at theology in particular was not exclusive to the university of Leiden. Attendance lists at the faculty of theology of the university of Utrecht mention the occupations of parents of theology students in 1825 and 1835. Table 5.2 groups these parents by socio-economic class using HISCLASS.[1] Of the 370 listed theology students, 39 were of foreign origin. These are excluded because they usually could not apply for private and public grants and because these students were not educated for the Dutch Reformed Church. Vicars' sons are grouped to illustrate their large presence at the faculty.

The results mirror the origin of Leiden theology students and also point out the significance of the academy monies for vicars' sons. Given the fact that all these students received 200 guilders their strong presence at the faculty does not surprise. Some 19% of theology students had fathers belonging to the two highest HISCLASS groups. Even after excluding vicars, the middle class made up 24% of all theology students. These parents, with a lower income, thus sent relatively more sons to study theology than the elite. Moreover, because the occupational status of Utrecht fathers was not listed on birth and marriage certificates the share of the middle and lower class was probably even higher, as they could keep their sons at home while studying instead of having to rent a room. Parents living off capital were explicitly listed, so the 21 fathers stated to be without a profession were perhaps even currently unemployed. It appears, then, that the combination of low tuition fees between 1820 and 1836 and the structural availability of many grants made theology the only field of higher education accessible for sons from less affluent middle-class families, thereby

1 Van Leeuwen and Maas, HISCLASS.

compensating the low attendance of the elite at theology faculties.[1]

Easy access to financial support broadened university access but also boosted enrolment levels. During the seventeenth and eighteenth centuries, when only some provinces granted academy money, around one-third of vicars had followed into their fathers' footsteps.[2] But as can be seen in Table 5.1 the share of theology students receiving academy money was continuously higher than one-third during the nineteenth century, and at some points even as high as 50% (1820 and 1840). The academy money thus had a stimulating effect on the number of vicars' sons at theology faculties, thereby raising levels of intergenerational status transfer.

The Dutch government realised around 1860 that this large share of vicars' sons was indeed a direct effect of extending the academy money in 1820, and as a result installed a committee to examine academy money policy.[3] They advised halving the allowance because it was no longer necessary. The minister of finance did not follow this advice possibly because the Reformed Church successfully lobbied against it by invoking historical entitlements.[4] In the 1870s the academy money was still 200 guilders annually.[5]

Vicars' sons could also receive academy money when studying something else, but that amounted to only 50 guilders a year. If job prospects were more important than financial assistance in determining study choice, we would expect more vicars' sons to have applied for this grant when demand for vicars was low, as was for instance the case around 1842. But even then only about 30 vicars' sons applied for the 50-guilder grant whereas more than 120 still opted to study theology.[6] We may thus conclude that the 200 guilders academy money boosted the number of Reformed theology students. This is all the more surprising since Vree has demonstrated that sons of vicars did not find a church position quicker than other theology students.[7] Studying cheaply was, then, more important than being able to find a job immediately after graduation.

Grant distribution policies of private foundations further boosted enrolment. Several grant foundations maximised the number of grants. Instead of

1 Cf. Rubinstein, 'Education and the social origins', pp. 176-8; Ringer, 'Admission', p. 250.
2 Van Lieburg, Profeten en hun vaderland, p. 102.
3 NA, Hervormde Erediensten 1815-1870, inv. 1990.
4 Handelingen (1864), Bijlage B, pp. 136-45.
5 NA, Financiën/ Erediensten, inv. 389.
6 Kamerstuk Tweede Kamer 1850-1851, kamerstuknummer XCVIII, ondernummer 5.
7 Vree, 'Overschot op de Nederlandse kandidatenmarkt', p. 46.

awarding large amounts to the few, they gave smaller amounts to the many. Since the average grant was 182 guilders, the indigent student had to collect a number of such grants to cover his study costs, forcing him into a juggling act if he needed to finance theology study entirely with grants. Middle-class groups, on the other hand, may have benefited from this grant distribution policy since the average grant provided just that extra bit needed to pay for a theology education. This seems to be confirmed by Table 5.2, where low social classes (for instance farmers and unskilled workers) are underrepresented, while middle-class groups and vicars dominated the faculty of theology.

Private foundations had no ties to the Reformed Church or the government, hence grant distribution was not tuned to demand for vicars. Several royal decrees demonstrate that the Dutch government did oversee the management of the private foundations, but did not interfere with the assignment of grants. Following the Napoleonic period private foundations were reinstated in 1818 and additional regulation was installed in 1823, 1840 and 1873. Although these decrees stated that the foundations had to send annual reports to the Minister of Education and notify available grants in newspapers, they also stated that 'the bestowing of grants should follow the rules laid down in the deed of incorporation of the foundation'.[1] This seems to suggest that the government indeed favoured a 'free market' policy where grant provision was not centrally coordinated but instead in the hands of the private foundations. It is, however, also possible that it was legally not feasible to overrule these deeds of incorporation.

Whatever the case, the result was that foundations lowered grants when demand for grants rose. The result was that more students received a grant precisely when enrolment was already peaking due to good job prospects. When a renewed demand for vicars pushed up the number of theology students in 1866, the Mijsberg foundation lowered most grants to around 100 guilders. Every third first-year Reformed theology student at the Leiden university now received a grant from this foundation. Several other foundations also tied amounts to the number of applications. Between 1846 and 1866 the estimated amount of financial assistance available to theology students in the province of Zuid-Holland increased from 4,400 to 7,480 guilders. Yet the average amount dropped from 220 to 170 guilders, so that more than twice as many students received a grant. The Utrecht theology professors, who managed some private foundations, also split several large grants into grants of 100 guilders when applications increased during 1850. When applications again rose in 1870, the curators further reduced the average amount to raise the number of students receiving financial assistance: one for every 17 theology students at the universi-

1 Koninklijk Besluit, May 17, 1873, article 23.

ty of Utrecht. The combination of these funding mechanisms, and the absence of coordination between them, the Reformed Church, and the government, resulted in a structural oversupply of theology graduates.

Financing Catholic theology students

Financial support for Catholic theology students was organised completely differently. To compare the financing of these students with that of Reformed theology students, data have been collected for the major colleges of Haarlem, Utrecht and Den Bosch. These colleges provide a fairly representative overview for the training of the Catholic Dutch clergy. The respective dioceses for which they trained accounted for at least 70% of all Dutch secular clergy between 1838 and 1890.[1]

Study costs at the three colleges were well below those paid by Reformed theology students. The major college of Haarlem charged 324 guilders a year from 1819, and only 315 guilders a year as late as 1900. Utrecht tuition fees were 250 guilders throughout the century. The major college of Den Bosch charged 180 guilders per year until 1873 and increased this to only 200 guilders during the last quarter of the century. These amounts included board and lodging. Assuming remaining expenses such as books and clothes represented a quarter of expenditure, Catholic college students paid around fl. 400 at most annually, about half of the costs of Reformed students.

These relatively low tuition fees widened access to candidates from lower social groups.[2] Table 5.3 demonstrates that more than half of all students enrolled at the Utrecht major college between 1857 and 1863 originated middle to lower class families. Indeed 8% of lower-class fathers were day-workers or unskilled labourers, while another large share were farmers. Only 13% of students' fathers were either higher managers or professionals. This relatively low origin of college students also seems to apply to minor college students in the province of Brabant during the 1880s.[3]

1 Handboekje voor de Zaken der Roomsch Katholijke Eeredienst (1869), pp. 59, 85, 115, 131, 156; Roomsch-katholijk Jaarboek (1838), pp. 15-82.
2 This continued during the first half of the twentieth century; Dellepoort, De priesterroepingen in Nederland, pp. 208-11.
3 Mandemakers, HBS en gymnasium, p. 294.

Table 5.3: Occupation of fathers of Utrecht Catholic major college students during 1857-63, compared to Reformed theology students (Table 5.2).

Class	Description	N	%	Utrecht Reformed theology students %
High	HISCLASS 1 to 3	16	13	19
Middle	HISCLASS 4 to 7	46	37	24
Low	HISCLASS 8 to 12	36	29	2
Vicars	Vicars of the Dutch Reformed Church	0	0	28
Other	Unknown, widows, without employment, deceased	28	22	26
Total		126	100	100

Notes: The profession of the student's father is obtained by linking the full name of the student, his place of birth and the full names of both parents to digitised birth or marriage certificates.
Sources: HUA, Aartsbisdom Utrecht: instituten voor de priesteropleiding , inv. 810. Birth and marriage certificates from www.wiewaswie.nl (accessed August 1, 2014).

Low tuition fees probably removed the necessity to use grants for attracting students. Utrecht tuition amounted to about half an annual skilled wage, but still several carpenters, shoemakers, and farmers could afford tuition without receiving grants. Instead, the colleges could afford to operate a strict selection procedure tied to financial incentives. College boards only admitted students likely to finish a theology education with success, and used grants and subsidies to ensure that a sufficient number of enrolled students graduated to fill the vacancies in their church district.[1] To achieve this they carefully monitored the performance of students.[2] For example, student Joseph Olivier Josset received a grant from the Haarlem directors in 1811 because he had talent and piety.[3] The boards could select on the basis of talent and determination because, unlike the Reformed grant foundations, they managed nearly all grant foundations themselves. Instead of financial assistance boosting student enrolment, as was the case for Reformed theology students, the college boards could balance supply through grants.

In Utrecht this policy can be observed at the Culemborg minor college, from

1 Het Utrechts Archief (HUA), Aartspriesters Hollandse Zending, inv. 1096.
2 Cf. Mandemakers, HBS en gymnasium, p. 287
3 Rogier and De Rooy, In vrijheid herboren, p. 190.

which students graduated to attend the major college for another four years. No student was eligible for a grant during his first year at Culemborg, so the board could observe the newly arrived and select those deserving a grant.[1] Any application required a reference from the local parish priest so that the board could assess a student's potential. Receiving a grant at the small seminary may have served as a basis for a further grant at the major college. At least 41 cohort students who did not receive a grant at Culemborg did not receive one at the major college either. Although the sources do not allow us to trace all students with subsidies between the minor and major college, subsidies of at least seven minor college students were continued at major college.[2]

A similar grant policy operated at the Den Bosch major college, whose curriculum took six years rather than four because it included two extra years of philosophy classes. Annual study financing has been collected for students enrolled at the Den Bosch major college between 1831 and 1891 at five-year intervals. The board predominantly awarded assistance to students who had stayed at the seminary for at least one year. Only 24 out of the total 107 grant students had received a grant during their first year at the grand seminary.[3] All other students received grant only after spending one year or more at the major college. Some of the first-year grants may have already been assigned by the minor college and for that reason were prolonged at the major college, as probably happened in Utrecht as well.[4]

Major colleges wanted to limit the wasting of grants by ensuring that students receiving them were capable and fully motivated to finish their studies. All colleges kept books listing the talent and progress of their students.[5] It seems likely that the boards did this to link grants and tuition fees paid to individual progress, so that grants were not given to less talented students. At the Utrecht major college subsidies were therefore only extended in the second half of the year, after tuition had already been paid. Colleges also did not hesitate to dismiss underperforming students. During the 1860s, for instance, the Utrecht board sent a few poor performers to a local Catholic order.[6] Another grant student at the Utrecht minor college was removed in 1888 when his talents proved too

1 HUA, Aartsbisdom Utrecht, inv. 320.
2 HUA, Aartsbisdom Utrecht, inv. 705.
3 DADB, inv. 175, inv. 176, inv. 1058. The cohort of 1851 was missing.
4 NA, BiZa / Hoger Onderwijs, inv. 863.
5 Noord-Hollands Archief (NHA), Haarlem, Seminarie Hageveld te Heemstede, inv. 626, inv. 627; DADB, inv. 959; HUA, Aartsbisdom Utrecht, instituten voor de priesteropleiding, inv. 815, inv. 816.
6 HUA, Aartsbisdom Utrecht, inv. 705

slight.[1] Also the diocese wanted to make sure that money was well spent. In 1831 the archpriest of Holland wrote to Haarlem major college stating that several students in the future had to collect their donations personally at his office, allowing him to better evaluate these students.[2]

A leaflet from 1819 demonstrates that this selection procedure did not fare well with all students. The writer, Adrianus van der Kuyl, had been removed from the Heerenberg major college because of misbehaviour. When he applied to the Utrecht archpriest for a grant to continue his studies elsewhere in the Netherlands he was told that he 'was no great loss to the Church' and as a result further grants from the colleges were denied.[3] In another leaflet Adrianus criticised the grant policy of the colleges because Catholic churchgoers entrusted the colleges with the distribution of their donations instead of supporting students directly, consequently blocking Adrianus's access to financial support altogether.[4]

Nevertheless, this policy of supporting relatively talented students did foster a high success rate. Grants awarded to the right students enabled them to follow the entire curriculum from minor through to major college and the priesthood. For some, grants awarded at the minor college smoothed the move to the major college. Moreover, data on the financial support awarded by the major colleges confirms that grants significantly reduced the number of students dropping out.

At the Den Bosch seminary receiving a grant smoothed the way from the philosophy to the theology department (the last four years). Continuing a grant from year two to year three boosted the chances of a student staying at the college. Only four out of 105 students receiving a grant in their second year at the grand seminary did not continue their studies at the major college. By comparison, of the 156 cohort students without a grant, as many as 47 did not make it to the grand seminary, i.e. they failed to stay at the seminary for more than two years. At Haarlem major college during the years 1867-1876, 37 of 46 cohort students with financial support had at least received their grant on starting their theology courses. As indicated, notes suggest that some of them had been given a grant during the previous year as well.[5]

Grants seem to have reduced dropping out not only because they were predo-

1 HUA, Aartsbisdom Utrecht, inv. 697.
2 NHA, Seminarie Warmond, inv. 93, letter of the director of Haarlem major college, March 1, 1831.
3 Van der Kuyl, Geschiedkundige verdediging.
4 Van der Kuyl, Een woordje aan alle gelovige roomsch katholijken.
5 DADB, inv. 812, inv. 1058.

minantly awarded to students capable of finishing their first two years, but also because once given the college boards rarely discontinued them. All grant students in Utrecht received the grant, usually 100 guilders, for their entire course of study. At Haarlem major college, 44 of the 46 grant students continued to receive a grant until they graduated or left the seminary. Even Wilhelmus Kortekaas's grant was continued when he returned to the seminary after being absent for more than a year, possibly due to illness.[1] Clearly grants helped students to continue studying.

The Den Bosch board reduced the chances of dropping out even further by progressively increasing grants. Table 5.4 gives the average grant amounts paid to students during their stay at the college. The longer they stayed, the more financial assistance they received per year. During his sixth year, the average grant student received more than twice the amount bestowed in his first year. Since grant students generally stayed no longer than about six months during their seventh year, grants even financed almost all tuition fees for grant students during this year, greatly helping them to graduate. By gradually extending the number and amount of grants, colleges motivated students to stay and finish their studies.

Table 5.4: Tuition fee financing for cohort students at Den Bosch major college, 1838-91.

Study year	Total Students	Grant students	%	Average grant (fl.)
1	263	24	9	71
2	240	58	24	92
3	213	74	35	110
4	201	81	40	108
5	172	76	44	122
6	155	76	49	157
7	86	44	51	131

Sources: DADB, inv. 175, inv. 176, inv. 1058.

At the major college of Haarlem too many students benefited from financial support. Data on tuition fees between 1819 and 1834 show that financial assistance lowered study costs for all Haarlem students by almost 30%. Because

1 NHA, Seminarie Warmond, inv. 168, fol. 156.

of grants and subsidies, students only had to pay fl. 230 annually out of their own pockets. During the years 1867-1876 more than 60% of the sample students could finance more than half of tuition fees with financial assistance. Grants not fully employed by some students because of graduation were sometimes transferred to make sure other students could finance their studies up to the point of graduation.[1] This increased level of funding was no coincidence. As will be shown, the number of church positions increased in this period, raising demand for Haarlem graduates. By extending funds, and also by making rich students assist poorer students, the Haarlem seminary was able to match this increased demand for clergy.

The selective grant policy of the colleges was successful in encouraging persistence and graduation. At the Den Bosch college, for which we have the largest sample, grant students dropped out far less frequently than other students, and they also completed their studies more often. In all, 93% of students who at some point received a grant completed their studies, compared with 65% of students without financial support. Almost one in three non-grant students dropped out before their third year, whereas only one of the 58 grant students present in year two did not stay for a third year. Of the remaining 57 grant students, 50 almost certainly finished their studies. The Den Bosch seminary thus effectively curtailed dropping out by giving progressively increasing grants to second-year students who had proved their capability.

Contrary to the Reformed Church, the Catholic districts acted in accordance with the colleges to ensure a stable supply of priests. As future employer, the diocese of Utrecht regularly informed the boards of Utrecht major and minor colleges on their demand for chaplains, and advised the board on how many students to enrol.[2] Mirroring the regional particularism this coordination was regional instead of on a national or central level. For instance, grants and subsidies were not centralised but disbursed at district level.[3] The subsidies given to Haarlem and Utrecht students were in large part funded by their church district through donations.[4] Between 1841 and 1856 the Utrecht district subsidised the tuition of its students attending the Haarlem major college, so they paid only 200 guilders instead of 324.[5] This ensured that the distance to a major seminary

1 NHA, Seminarie Warmond, inv. 168 (no page numbering from cohort 1876). Notes at students Bensdorp, Ten Brink, Haastrecht, Galen, and Borsboom.
2 HUA, Aartsbisdom Utrecht, inv. 705; HUA, Aartspriesters Hollandse Zending, inv. 1096.
3 NHA, Seminarie Warmond, inv. 166, 'Staat van betaling kostgelden 1841-42'.
4 HUA, Aartsbisdom Utrecht, inv. 320, inv. 340.
5 NHA, Seminarie Warmond, inv. 166.

would not deter Utrecht students from enrolling, thus safeguarding clergy for the Utrecht district. Moreover, students needed approval from their diocese if they wanted to become missionaries rather than priests.[1] Abandoning the route towards priesthood could also have financial consequences. The father of Johannes van Aarnhem, a tailor in Jutphaas near Utrecht, had to declare in 1919 that he would repay all his son's grants should he become a missionary instead of serving the diocese of Utrecht.[2] Reformed theology students never had to reimburse grants.

The Catholic training system was characterised by monitoring demand for priests, followed by carefully selecting students, and providing grants to ensure that supply met demand. The combination of close ties with their local church district and a relative financial independence gave the minor and major training colleges more control over student selection and financing compared with the heterogeneous funding mechanisms for Reformed theology students. Consequently, the colleges could combine low tuition fees with graduation numbers closely balanced to job-market needs. This emphasis on selection, persistence and graduation proved favourable for the job market for chaplains and priests. Of all students enrolled at Utrecht major college during 1854-1863 approximately 85% became clergy in the Utrecht diocese.

Student financing and the labour market

The literature has generally characterised nineteenth-century graduate labour markets as a 'pork cycle', meaning that they showed cyclical fluctuations in the supply and demand for students.[3] If the labour market outlook was good enrolment would increase. Because studying takes time demand seemed to persist even after the initial increase in enrolment, causing more students to enrol than were needed for the labour market.[4] This resulted in an oversupply of candidates, deterring aspiring students, and leading to an undersupply. Demand would again rapidly increase when the previous generation retired, and the cy-

1 HUA, Aartsbisdom Utrecht, inv. 705, letters from August 14, 1866 and December 8, 1867.
2 HUA, Aartsbisdom Utrecht, inv. 320; NHA, Aartspriester van Holland en Zeeland, inv. 868.
3 Titze, 'Die zyklische Überproduktion von Akademikern', Titze, Der Akademikerzyklus.
4 Van Rooden, 'Van geestelijke stand naar beroepsgroep', pp. 367-8.

cle would repeat itself.[1] Such cycles are usually found when 'a given course of study invariably prepares for a specific profession', like studying theology.[2] As demonstrated by Van Rooden and Figure 5.3, this cycle unmistakably applied to the enrolment of Reformed theology students during the nineteenth century, with enrolments peaking during 1820-1830 and 1850-1860, and dropping before and after every peak.

Figure 5.3: Enrolled Reformed theology students, 1815-77 (estimate).

Notes and sources: see Table 5.1.

Nevertheless, the data presented above make a strong case for arguing that not only labour-market demand but also uncontrolled enrolment combined with low tuition, and the absence of grant coordination affected these cycles significantly. The enrolment of Reformed theology students was boosted by three factors: tuition fee policy, the academy money for vicars' sons, and a 'free market' for private grants. As to the first factor, it is no surprise that student numbers soared from 1820 to 1836 after the abolition of tuition fees. The second factor, granting 200 guilders to all sons of vicars studying theology, caused a very large share of them to do so, even when demand for vicars was low. Table 5.5 demonstrates that around 40% of all Reformed theology students we-

1 Jensma and De Vries, Veranderingen in het hoger onderwijs, p. 167.
2 Ringer, 'Admission', p. 236.

re sons of vicars. Even though the Reformed Church around 1830 thanked the government for increasing access to the Theology faculties, they also conceded that academy money together with the absence of tuition fees had caused an oversupply of graduates.[1]

While the academy money ensured that even in periods of low demand many sons of vicars still attended university, private grants boosted student numbers when labour-market demand by itself already attracted a sufficient number of students. By spreading grants wide this policy worked procyclically, enabling more middle-class students to finance their studies, and reinforced the oversupply of students. That is why in 1835 politician William Schimmelpenninck van der Oije argued that these generous levels of financial support had to be reduced.[2] During the same year the Reformed Church identified that too many students frequented the faculties of Theology.[3]

Table 5.5: Estimate of vicars' sons studying theology annually.

Period	Theology students (mean)	Vicars' sons studying theology (mean)	%
1815-1820	182	72	39
1821-1830	389	180	47
1831-1840	440	184	42
1841-1850	246	112	46
1851-1860	477	177	37
1861-1870	324	140	43
1871-1877	300	98	33
1815-1877	343	140	41

Notes and sources: see Table 5.1.

Nor did it help that everyone with the right qualifications had access to a faculty of theology, so that, unlike the seminaries, enrolment could hardly be controlled. This is reflected in a comment in the newspaper the *Algemeen Handelsblad* of 1838, stating that 'it used to be old wine that shines, now it is only foamy barley beer: because as soon as they have sufficient money scraped together by painting, chopping or carpentering, the son has to go to university, capable or not, it does not matter'.[4]

1 Handelingen (1830), p. 9.
2 Handelingen der Staten Generaal, December 11, 1835, p. 86.
3 Handelingen (1830), p. 9
4 Otterspeer, De wiekslag van hun geest, p. 432 (author's translation).

Consequently, Dutch universities continuously trained more theology students than the Dutch Reformed Church needed. In 1819 the general synod had calculated that 40 graduates a year would suffice in order to have sufficient vicars, which required a total of 259 theology students.[1] However, from 1820 to 1836 the average number of theology students was 440 per year, way more than the Church needed to fill vacancies. Already in 1822 the number of students, approximately 300, was sufficient to staff the Church, yet enrolment continued to increase to a staggering 700 in 1829. Student numbers only really began to decline after 1836, not surprisingly the year in which tuition fees were reinstated. But even during this trough in the cycle of theology students, which lasted until 1850, still too many theology students were educated. Even at the bottom of the cycle more than 200 theology students attended the universities.

Moreover, the pool of graduates waiting for a position reduced the need for new theology students further and further. This can be seen in Figure 5.4, which gives the annual number of available theology graduates. Even during periods of low demand in the 1850s around 100 candidates were still waiting for a position as vicar, demonstrating that the surplus of theology students was not only a problem of the 1830s and 1840s.[2] The oversupply seems to have decreased only when the schism in the Dutch Reformed Church around 1880 probably put off potential students, and led to the creation of a new university.[3]

A sample of around 24% of all students taking the vicar's exam between 1820 and 1872 demonstrates that opportunities for the excess number of graduates were limited outside the Church.[4] It was not uncommon to wait as much as four years for a position as vicar. The Reformed Church did feel for these jobless candidates and many became 'assistant vicars', a function that was expanded especially to take up the excess number of graduates. Most of these assistants were poorly paid, either by the local church board or the government. There are many examples of assistant vicars never being able to rise the position of vicar. Only from the 1860s did a new type of Dutch secondary school offer a limited outlet for these graduates.[5]

1 Handelingen (1819), pp. 22-3.
2 Vree, 'Overschot op de Nederlandse kandidatenmarkt', p. 23.
3 Jensma and De Vries, Veranderingen in het hoger onderwijs, pp. 179–80.
4 Sample of over 820 protestant theology candidates between 1820 and 1872 from Vree; 'Lijst van (voornamelijk Hervormde en Lutherse) Predikanten, Hulppredikers'; Jensma and De Vries, Veranderingen in het hoger onderwijs, pp. 173–4.
5 Bos, Servants of the kingdom, pp. 294-5.

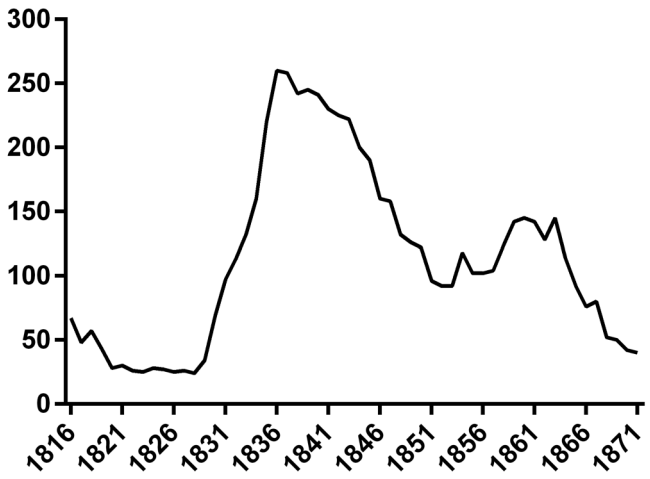

Figure 5.4: Available candidates for the Reformed Church.

Source: Vree, 'Overschot op de Nederlandse kandidatenmarkt', pp. 20-21.

By consulting Protestant magazines like *De Boekzaal* or *De Gids*, Reformed students could relatively easily have noticed that there were too many theology graduates and that their prospects were poor. Contemporaries were well aware of these lists.[1] These magazines not only published the number of available candidates, but also advertisements of jobless graduates offering their services as assistant-vicars. For instance, *De Boekzaal* recorded an average of 181 available candidates during the 1840s.[2] The fact that neither these numbers nor the advertisements put off potential theology students underlines the importance of the wide availability of grants in maintaining a surplus of theology students even in periods of low demand.

Contemporaries noticed the link between financial support and the oversupply of theology graduates. Because sufficient theology students would also have been attracted without 'enticements' such as grants, an anonymous leaflet in 1834 called for the abolishment of study grants. The author also proposed a tax on theology students to support the large number of unemployed graduates. Abolishing grants would also have the 'beneficial' effect of deterring many

1 Bos, Servants of the kingdom, p. 176.
2 Vree, 'Overschot op de Nederlandse kandidatenmarkt', pp. 20-1.

lower class students who now studied theology.[1] In 1868 some Reformed *classis* discarded a clause to increase study grants for sons of vicars, arguing that the number of grants for theology students was already more than sufficient to meet demand.[2] Regrettably, we can only guess as to why financial incentives were not further reduced, or reduced earlier.

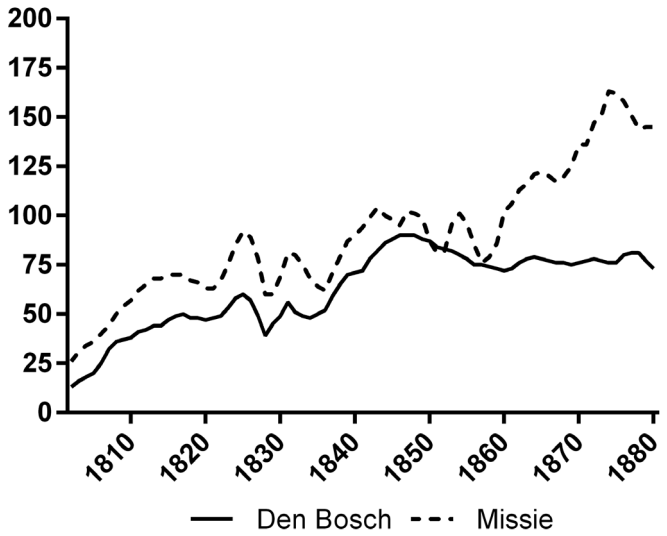

Figure 5.5: Attendance at the major colleges of Den Bosch and the Missie (3-year moving average).

Notes: The ratio of Heerenberg to Den Bosch students between 1837-42 is used to estimate the number of students at Heerenberg during 1800-37. Estimates are based on average enrolments, graduation rates and study length.
Sources: DADB, inv. nos. 175, 176, 1058; HUA, Aartspriesters Hollandse Zending, inv. 1981; HUA, Aartsbisdom Utrecht: instituten voor de priesteropleiding, inv. 810; NHA, Seminarie Warmond, inv. nos. 85, 92, 93, 121, 166, 167.

The oversupply of Protestant theology students emanating from an absence of coordination in student funding contrasts sharply with the Catholic colleges. These colleges succeeded in tailoring the number of graduates closely to demand by a policy of selection and monitoring, backed up by judicious grant awards. As

1 Philocandidatus, Middelen ter plaatsing van een aanzienlijk getal proponenten.
2 Handelingen (1868), p. 36.

Figure 5.5 shows, attendance levels of Catholic theology students show no cycles at all. Student numbers for both Catholic districts remained more or less constant throughout the nineteenth century, the only disruption around 1825 being a temporary one following an interruption in the flow of students from minor to major colleges.[1] The gradual increase in student numbers simply reflected a rising number of clergy positions. Student numbers in Den Bosch increased until about 1848, in line with the number of chaplain positions. At the colleges of Haarlem and Utrecht the growth in students from 1857 mirrored the expansion of the clergy. As explained, the Haarlem college matched this rise by extending more grants and subsidies and allowing more leeway in tuition fee payments.

The job market for Catholic clergy has not been documented. Following the approach by Van Rooden, fluctuating average terms of clergy office indicate job market cycles.[2] When the number of vacant positions for chaplains and priests was low, the average length of office should have increased, since chaplains or priests would be less able or willing to switch parishes. Conversely, a shortage of clergy should have translated into declining average terms of office, since parishes would compete for priests from other parishes. A shortage of priests would also have quickened the promotion from chaplain to priest, further decreasing average terms of office of chaplains.

Table 5.6: Average number of years in current office.

Year	Chaplains		Priests	
	Den Bosch	Missie	Den Bosch	Missie
1838	5.5	6.4	13.8	11.7
1843	6.0	5.8	14.3	10.9
1847	5.4	6.8	13.8	10.5
1853	5.7	5.8	14.5	10.5
1863	5.7	4.3	14.6	11.6
1873	6.9	4.7	15.0	11.7
1888	6.1	5.0	11.6	11.8

Notes: 1857 was omitted because the source did not allow to reconstruct terms of office.
Sources: *Roomsch-katholijk Jaarboek* (1838, 1843); *Handboekje voor de Zaken der Roomsch Katholijke Eeredienst* (1847, 1853, 1863, 1873); *Pius Almanak* (1888).

1 Rogier and De Rooy, In vrijheid herboren, pp. 35-6.
2 Van Rooden, Religieuze regimes, pp. 51-5.

Based on more than 7,500 observations in Catholic almanacs, Table 5.6 lists average office terms for priests and chaplains in the two church districts between 1838 and 1888. Only Den Bosch chaplains around 1873 were in office for longer than usual, probably because the number of chaplains positions increased faster than the number of priests. By 1888 this was resolved since the terms of office of Den Bosch priests dropped again, as chaplains who had to stay in office longer around 1873 had now been promoted. Otherwise the average terms of office showed remarkable stability. This consistency suggests a very constant labour market. In contrast to the labour market for vicars, this demonstrates that the two Catholic areas were able to match the influx of graduates to the number of clergy needed in their district.

To prevent unemployment, an oversupply of graduates could still have been masked by installing more offices when there was no actual need for them. This can be identified by the ratio of clergy to Catholic inhabitants in both districts.[1] The stable ratio of 1.1 clergy per 1.000 Catholics throughout the century in both districts nevertheless demonstrates that there never was an oversupply of clergy. In the Missie, this resulted in almost a thousand clergy for approximately 795,000 Catholic inhabitants by 1879 – keeping a ratio comparable to 1830 when there had been only 531,000 Catholic inhabitants. Not surprisingly, the number of clergy in both districts strongly and significantly correlates to the number of Catholic inhabitants throughout the nineteenth century, and also to the number of college students.[2] The Haarlem, Utrecht, and Den Bosch districts thus judiciously balanced student numbers with the growing need for clergy in their parishes, without this resulting in student cycles.

Conclusion

Both Reformed universities and Catholic colleges offered financial support to ease access to higher education for students. Both thereby attracted a relatively large number of students from low social groups, the limited data available suggesting that in this respect the Reformed theology departments differed markedly from other faculties. Low tuition fees plus similar amounts of financial support for Catholic college students also resulted in a high share of students from lower social classes. The easy access to financial support offered to

1 Catholic inhabitants from the censuses of 1830, 1840, 1859, 1869, 1879, 1889 from www.volkstellingen.nl (accessed November 12, 2013). Catholic clergy from Table 5.6.

2 $n = 6$, $r = 0.92$, sig. $= < 0.05$; $n = 42$, $r = 0.72$, sig. $= < 0.01$.

these students in particular indicates that low costs historically promoted access to higher education.[1]

The way in which this assistance was provided mattered a great deal for enrolment, graduation, and job opportunities. Contrary to the Reformed Church each Catholic college had close connections with its diocese, so the boards could tailor enrolment and graduation to vacancies in their region. The colleges could do this because they were free to select at the gate, and because they controlled grant funds themselves. This enabled them to use grants not only to ease enrolment and broaden access, but also to encourage students to persist and graduate. This coordination on a regional level balanced relatively open access with labour market demand in all church districts.

An absence of coordination between the universities, the Church and grant foundations prevented the formulation of a coherent grant policy tuned to job opportunities for Reformed theology students. Neither the Reformed Church nor the universities could select or monitor theology students, and they had no say over tuition fees. Private grants were distributed based on student demand, which had a procyclical effect on attendance. Academy money further reinforced attendance, and the government was, for reasons unknown, reluctant to abolish this grant when it was no longer necessary. This Dutch example suggests that cycles of graduate oversupply, which can be observed throughout eighteenth and nineteenth-century Europe, might have been resolved by closer coordination between financiers, institutions of higher education, and employers. More research is needed to see if this holds for other types of higher education as well.

The success of both types of student funding ultimately depends on the parties considered. In contrast to elementary education, the oversupply of Reformed graduates was not really beneficial to society, since employment opportunities for these graduates were limited in this period. Meanwhile, government costs rose following the abolition of tuition fees. The Reformed Church did benefit because it could select the most talented candidates. Graduated Reformed students indeed feared to be rejected on the basis of wearing glasses alone, because so many applicants were available.[2] The efficient use of study grants reduced training costs for the colleges. However, their emphasis on balancing enrolment with vacancies did imply that a large share of admitted students needed to graduate, even if some eventually proved less talented. Some correspondence does suggest that colleges deliberately sent lesser talented students to small parishes.[3]

1 Edirisooriya, 'A market analysis', pp. 123-5.
2 Bos, Servants of the kingdom, pp. 178-9.
3 HUA, Aartsbisdom Utrecht, inv. 705.

Perhaps it is no surprise that coordinated funding at the regional level enabled a closer match between supply and demand. The historical provision of elementary and secondary education in Europe and the United States succeeded in particular when it was organised by towns or provinces.[1] Moreover, the success of higher education in the United States is also ascribed to decentralised funding and local control.[2] The similarity between these cases suggests that the level and distribution of student funding may be important for understanding the development of higher education as well.

1 Savoie, 'The role of cities'; Goldin, 'The human-capital century'; Lindert, Growing public, vol. I, chapter 5; Beadie, 'Tuition funding for common schools'; Westberg, 'Stimulus or impediment?', p. 17.

2 Goldin and Katz, The race between education and technology, pp. 138, 260.

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Chapter 6. Conclusion

During the long nineteenth century the Dutch economy changed dramatically. From the beginning of the century and initiated by king William I, an active policy of industrialisation was pursued on top of promoting international trade through companies such as the *Nederlandsche Handel-Maatschappij*. From the middle of the century onwards both the service sector and industrialisation really took off. According to Van Zanden and Van Riel this process was stimulated by liberal reform and by the new constitution of 1848, drafted by Thorbecke. The removal of earlier strictures imposed by the personal rule of William I, and the stimulation of Dutch unification, as opposed to the early modern politics of local particularism, finally ensured that the Netherlands was placed on the path of modern economic growth.[1]

This thesis has examined how the education and training of skilled workers was adapted to these changing conditions. Crude evidence on the skill premium suggests that industrialising countries experienced little problems in ensuring skilled workers during this period of structural labour-market transition, and possibly also before. The skill premiums presented in this thesis further seem to suggest that by the turn of the twentieth century the provision of Dutch white-collar and blue-collar workers was eventually more than adequate. Although the reforms undertaken by the central government were arguably vital in spurring the process of Dutch industrialisation, it has been examined how this decline in skill premiums was brought about, and whether the central government was as vital in this process of educational adaptation as it was in spurring industrial catch-up.

Local versus central

The central government did play a part in the adaptiveness of educational institutions. Without laws enacted centrally, and without funds and subsidies

1 Van Zanden and Van Riel, The strictures of inheritance.

extended by the government, the process of educational adaptation may have been more difficult. Moreover, municipalities were able to adapt education provision in the first place because the central government had returned authority with the municipality law of 1851. Furthermore, adaptation only seemed to have worked well once changes in the central government had reduced local particularism and corporatist interests, such as the guilds. After all, Dutch craft guilds primarily acted at the local or urban level, but obstructed instead of promoted skill formation. Because of rent-seeking motives such as limiting the number of apprentices per master, access to on-the-job training only really improved after the Dutch government abolished the guilds around 1820. Some coordination between the central and local level may therefore have been required to ensure that local interests or lack of funds would not hamper the provision of skilled workers.

What nevertheless stands out in all the chapters is the importance of local authorities in the process of educational adaptation. Local rulers such as city boards were key in providing the new types of schools needed for the training of skilled workers during Dutch industrialisation. When demand for white-collar workers increased from the end of the nineteenth century and the HBS provided too few of these workers, municipalities began to fund commercial schools to supplement the number of adolescents entering these jobs. When about a decade later also relatively lower-skilled white-collar workers were in short supply, municipalities again stepped in and provided part-time commercial schools. Equally, when it proved that on-the-job training for blue-collar workers became increasingly unfeasible due to an absence of skill certification and a growing division of labour, municipalities again ensured that sufficient workers were provided by establishing and funding vocational schools. In contrast, the reorganisation of higher education in 1815 - one of the few centrally coordinated post-elementary educational changes - provided too many theology students for the labour market mainly because of ill-advised tuition fee policies. Regionally coordinated Catholic seminaries, on the other hand, proved better able to match supply and demand because their regional organisation allowed them to orientate student funding towards the labour market.

Within the boundaries set by the central government, local governments were key to changes in the educational system. While the central government provided some funds and established legal borders, municipalities had room to decide which schools were to be provided and how much funding they should receive. Local employers and societies often initiated these changes by lobbying for new schools at the local level. Collaboration between the municipality and local parties ensured that post-elementary education provision could match demand for skilled workers at the regional labour market. It is, for instance, not

a coincidence that Amsterdam and Rotterdam were among the first to found a commercial school, seeing that trade and commerce were important sectors here. In the same vein it is also understandable that vocational daytime schools emerged in cities with large industries such as Leiden. Conversely, some schools that were implemented top-down failed, such as the *burgerdagscholen*. This can be attributed to their general curriculum in a period when children from the lower classes - for whom these schools were intended - demanded a vocational education.[1] Because the founding of these schools was ordered by the central government, there was no room to change the courses taught, while at the same time support from local employers was absent. As a result, only a few of these schools still existed in 1905. The same story applies to a lesser extent to the HBS5, which amongst others was adapted in the 1920s to match demand for white-collar workers.

Examining educational adaptation at the micro-level shows that historical institutional change is not necessarily an inevitable process in search for the most efficient institutions, marked by big breaks.[2] Some arguably inefficient institutions, such as guilds, survived prolonged periods while beneficial changes could take some time to materialize.[3] Moreover, besides the French period most institutional changes in the provision of Dutch education occurred without far-flung revolutions or regime changes. For instance, the same regime change that abolished guilds also caused an oversupply of theology students. It may therefore be more fruitful to approach the process of institutional change as one of continuous active adaptation, instead of focusing on 'big changes in the context of big historic breaks', as is often the case in literature on institutional change.[4]

Continuous adaptation was crucial during these early stages of educational change. With rapidly changing labour markets and regional variation in demand for skills, schools needed to be able to change constantly. Adaptation was easier done on the local than the central level.[5] This could for instance be observed at the vocational schools, which were able to adjust their vocational tracks based on demand from local industries and technological change. When local industries began to make use of steam and electricity it proved relatively easy to add courses on these technologies. Thorbecke may have already realised this

1 Goudswaard, Vijfenzestig jaren nijverheidsonderwijs, pp. 254–5.
2 North, Institutions, institutional change, pp. 18-9, 144, 155; North and Weingast, 'Constitutions and commitment'.
3 Cf. Ogilvie, ''Whatever is, is right'?'.
4 Thelen, How institutions evolve, p. 292.
5 Cf. Boekholt, Het ongeregelde verleden.

when he returned authority to municipalities in 1851. The 'decentralized unitary state' consequently ensured that demand for skilled workers could be met by adapting education provision locally.

A logical next step would therefore be to further examine the dynamics of the local level. Lindert and Goldin argued that local voting patterns explain the process of educational adaptation, while Beadie and Westberg suggested that local control over educational funding explains why municipalities could react to changing demand for schooling.[1] Since few educational decisions were put to the vote locally in The Netherlands and the franchise was limited until 1917, it could be expected that especially the relatively large control over educational funding at the local level explains why Dutch municipalities were able to implement educational changes. In contrast to countries with relatively centralized governments, Dutch municipalities were able to fund new schools whenever they signalled demand for these types of schools. In nineteenth-century England this was arguably not possible to the same extent because little governance structures existed at the local level.[2] Hence, local control over funding may explain why some countries were able to provide the right types of schools and others were not.

A question that future research consequently should address as well is the link between the financial power of Dutch municipalities and educational changes, especially before the central government increased public funding from the 1920s. Did municipalities with limited local fund experience a lag in educational provision, with a rising skill premium as a result, or did the central government explicitly extent more subsidies to these municipalities? Contrasting these findings to research on educational adaptation in relatively centralized countries may help to single out the significance of the local level, and local funding.[3] For instance, the extension of public schools in the Americas seems to have been partly frustrated by lack of funds at the local level, but also by 'difficulties in the demarcation of political authority'.[4]

1 Lindert, Growing public; Goldin, 'The human-capital century'; Westberg, 'Stimulus or impediment'; Beadie, 'Education, social capital and state formation'.
2 Green, 'Technical education and state formation', p. 138
3 Cf. Stoddard, 'Why did education become publicly funded?'.
4 Engerman, Mariscal, and Sokoloff, 'Schooling, suffrage, and the persistence of inequality', p. 213.

On-the-job training versus schools

It is not self-evident that municipalities took the stage in funding and organizing educational adaptation. Firms and employers could just as easily have provided schooling, most notably through on-the-job training. Yet the case-studies demonstrated that Dutch employers were rarely keen to pay for training because of the risk that these workers would be poached by other employers. Only the Dutch Catholic districts paid a relatively large share of the training costs of priests themselves, but they could do so only because poaching risks were limited. The skill taught to these students were quite firm-specific to say the least, and were also not really transferable.[1] Nevertheless, other employers could theoretically have organized on-the-job training and certification just as the guilds had done during the early modern period. Although Dutch craft guilds did not reduce risk of opportunism, completing an apprenticeship did provide some skill certification.

It is not difficult to see why the practice of skill certification and apprenticeship regulation was not initiated in The Netherlands during the nineteenth century. As Thelen has demonstrated, different countries instigated different solutions to solve the poaching risks inherent in skill formation. Subsidizing and certifying apprenticeships, for instance, was chosen in Germany to train blue-collar workers.[2] In the Netherlands this route was proposed as well, but the small size of many Dutch firms and workshops made this option unattractive and relatively costly. Dutch employer organisations who represented these smaller workshops instead argued for vocational schools over apprenticeships, whereas large firms opted for an apprenticeship system.[3] Employers had little incentive to provide and regulate on-the-job training out of fear of poaching and because of an increased division of labour. It seems that local public funding therefore provided the best solution. In this way costs were still partly paid by adolescents, but could be kept low enough as to ensure that enough workers were educated. It is telling that apprenticeship did become a fruitful training route after the 1930s when firm size generally increased, and sector-based agreements ensured that employers equally contributed to training costs.[4] Before that, the structure of Dutch commerce and industry cau-

1 These skills were transferable to Catholic (missionary) orders and it seems that the seminaries did try to prevent their students entering these orders after graduation, for instance by making students reimburse grants.
2 Thelen, How institutions evolve, ch. 2.
3 Wolthuis, Lower technical education in The Netherlands.
4 Anderson, 'The long road to collective skill formation'.

sed that publicly funded education was the most likely solution.

In nineteenth-century Amsterdam firms did try to reduce the risk of poaching of white-collar workers by using internal labour markets. They could do so likely because of the relatively large size of these firms compared to workshops. At these banks a single port of entry and deferred compensation was used to entice workers to stay. However, internal labour markets could not fully ensure that all their white-collar workers stayed simply because demand for these workers was very high. As a result they had to increase wages for young workers to attract sufficient staff. The introduction of commercial schools proved a more efficient and less costly way to attract new staff from the viewpoint of employers. The supply of white-collar workers increased greatly through commercial schools, and may have caused internal labour markets to decline. Moreover, because also these schools were relatively affordable the supply of workers increased, causing wages to drop and the skill premium to decline from the turn of the twentieth century. Consequently, also here the emergence of formal post-elementary schooling lowered training and selection costs for firms, and reduced poaching risks.

Thus, between 1860 and 1920 on-the-job training for vocational and white-collar occupations gradually declined to be replaced by publicly funded formal schooling. This move towards formal education seems to fit with the theory proposed by Galor and Moav. They argued that during the second stage of industrialisation employers may have needed more skilled workers to sustain their profit rates. As a result they had an incentive to promote public education for the masses.[1] Relatively limited demand for human capital before the nineteenth century then perhaps caused that local craftsmen had little incentive to push for educational changes, possibly explaining why craft guilds could exist for such a prolonged period. When demand for skilled workers increased during the nineteenth century, Dutch employers may indeed have lobbied at the local level in particular for more schooling, through close ties with local politicians or through employers' organisations. As Mijnhardt and others have demonstrated, nineteenth-century Dutch society was highly organized in *genootschappen* - associations and societies that pursued particular interests - so this is not an untenable hypothesis.[2] It would be interesting to examine this perceived link between employers and politicians or local rulers more closely.

Besides these arguments, it is still conceivable that local politicians simply favoured to increase the supply of education because of some positive exter-

1 Galor and Moav, 'Das human kapital'..

2 Mijnhardt, Tot heil van 't menschdom; Kloek and Mijnhardt, Dutch culture in a European perspective.

nalities. More skilled adolescents may have attracted more firms, could have lowered crime levels, or the number of wandering youth. Promoting education may also have originated out of cultural or enlightened motives, as a means to increase the intellectual wellbeing, or promoting citizenship. It is, however, unlikely that cultural motives explain public funding of vocationally-oriented or job-specific types of education in particular. For these types of education it seems that labour-market demand and individual gains were more important.

Employers were of course not the only ones interested in skilled workers. Adolescents themselves especially benefitted. The case-studies suggested that the individual benefits of education were tied to the type of education provided, and go a long way in explaining why adolescents were willing to face tuition fees and opportunity costs. It made only sense to pay for education when the benefits were clear. These benefits were not solely higher earnings, even though commercial school pupils probably earned relatively higher wages because they had more skills. Vocational school pupils hardly earned higher wages but still these schools proved quite popular. The benefits of these schools lay in the fact that their degrees provided valuable labour-market advantages. Having a degree signalled craft skills to employers, and employers used this information to screen applicable candidates. Therefore, these adolescents were appreciated over those without a degree. The same reasoning explains why apprenticeships under the guilds paid off. Conversely, on-the-job training dwindled during the end of the nineteenth century precisely because youths no longer had an incentive to give up wages and pay for insecure training without being able to signal their skills after training was complete.

Credentialist theory proposed that education could serve to monopolize access to occupations by people with certain cultural dispositions.[1] Yet it is difficult to see the types of education examined in this thesis in this context. In most types of education access to schooling greatly expanded, very likely also for social groups other than the elite. When tuition fees were lowered for theology students, even relatively lower middle classes gained access to university and also to vicar positions. Vocational schools were never an elite type of education. Data on the social origin of Utrecht orphans attending the vocational school suggest that access to these schools, or to subsequent crafts, was not based on social origin. Moreover, commercial part-time education was one of the most socially accessible types of education, while at the same time it appears to have increased access to white-collar work. Cultural hegemony over some occupations may even have been more pronounced before the coming of educational changes, as craft guilds did try to restrict access and privileged sons of crafts-

1 Brown, 'The social sources of educational credentialism', p. 20.

men. For the types of education studied, it seems that degrees mainly served to signal (relative) skills and reduce uncertainties in the hiring process.

The shifting balance between on-the-job training and formal schooling, given in by these incentive structures, has important consequences for future historical research on human capital formation. A lack of data means that human capital is often measured through figures on school enrolment.[1] Nevertheless, not only does this thesis demonstrates that there were differences in the types of skills acquired, it also shows that many workers without formal credentials may have been just as skilled as those who had been enrolled in school. But since the latter obtained their skills through on-the-job training instead, they are largely missed in estimates of human capital formation. Incorporating on-the-job training is thus essential to compare historical levels of human capital formation between countries.

Benefits of a comparative micro-level approach

The role and functioning of institutions within societies is often seen as a key determinant in explaining processes of social and economic development. The degree to which institutions could adapt to changing circumstances and facilitated change is therefore of central importance. Some institutions may have obstructed economic or social developments through rent-seeking motives, such as serfdom in Eastern Europe.[2] In other countries institutions adapted and thereby facilitated economic change, such as more secure property rights.[3] As indicated, the thesis has tried to improve our understanding of educational change by demonstrating that in several cases institutional change was a process of gradual adaptation instead of a process of big breaks or ruptures. This became apparent because of the comparative micro-level approach employed in the different chapters. Such an approach, using new empirical data, could counter-balance a recent trend in economic history to focus on big breaks using primarily macro-level data.[4] Many facets of economic development have to remain unexplained when only cliometrics are employed.[5] While the latter methodology can point out trends and larger processes at work, it is only through

1 Cf. Becker, Hornung and Woessman, 'Education and catch-up'; Schulz, Maas and Van Leeuwen, 'Occupational career attainment'.
2 Ogilvie, ''Whatever is, is right'?'.
3 North, Institutions, institutional change.
4 Cf. Acemoglu and Robinson, Why nations fail.
5 Drukker, De revolutie die in haar eigen staart beet.

zooming-in and comparing institutional adaptation at the micro-level that we can really understand these observed trends. This thesis has employed such a micro-level comparison on different levels, and such an approach may not only prove valuable for our understanding of educational adaptation, but perhaps also for institutional change in general.

The importance of comparison at the micro-level stood out in three aspects. First, in order to isolate political variables the local needs to be contrasted with the level of authority of the central government. For educational changes to be initiated locally it seems a first condition that there is enough room to do so. Adapting educational institutions at the local level may therefore have been especially feasible in states with a relatively decentralized political structure. This thesis points out the importance of local politics, and it may not be a coincidence that most other studies on successful educational change are from relatively decentralized states such as Prussia and the United States as well. Relatively slow education change is conversely more often observed in centralized states such as France and England.[1] A comparison between these two types of states may help to single out the importance of instigating and financing educational change at the local level.[2] Moreover, only by zooming-in at the local level can we then really evaluate differences in educational organisation between different types of states.

A second important method of comparison is to examine institutional change before and after perceived breakpoints. As argued, 'big breaks' such as regime changes may neither have been a necessary nor sufficient condition to reach more efficient institutions. A longer time frame than breaks alone helps to evaluate whether breakpoints are indeed as important as is often claimed in the literature.[3] Breakpoints are all too often seen as institutional game-changers, while taking a longer time-frame may demonstrate that this assumption does not always hold, or holds only partially. Combining this with a comparison of the changing opportunities for individuals may prove to be further insightful for our evaluation of institutional change. For instance, the abolishment of the guilds is still largely considered to have detrimentally affected on-the-job training. But simply comparing the same group of adolescents before and after the Ancien Régime showed that until the advent of industrialisation on-the-job training continued to function quite well, and that guilds may even have obstructed skill formation.[4]

1 Ringer, Education and society in modern Europe.
2 Savoie, 'The role of cities in the history of schooling'; Beadie, 'Education, social capital and state formation'.
3 For this literature see Thelen, How institutions evolve, pp. 28-30.
4 Cf. Humphries, 'Rent seeking or skill creating'.

The chapters further demonstrate the importance of examining the effects of institutional changes with as many homogenous sources as possible. Orphanage data and also the staff registers of the *Nederlandsche Handel-Maatschappij* were crucial to examine the effect of institutional adaptation because these sources remained constant over a prolonged period, most notably before and after schools were introduced. Orphanages continued to apprentice boys both during and after the guilds existed and recorded this in the same manner. The NHM recorded working experience and educational attainment of newly hired staff (for the same functions) before and after the HBS was introduced in the same manner as well. Because these sources remained homogenous it allowed to evaluate relatively unbiased if changes in education provision really affected hiring practices and skill formation.

If such homogenous data are not available, a third method that of comparison that proved fruitful is using a between-group comparison after educational changes were implemented. For instance, it proved difficult to compare the funding of university students due to lack of data covering the 1815 breakpoint. This was resolved by comparing students with a similar education under a dissimilar institutional setting, as a sort of control group. Also the chapters on vocational and commercial training demonstrated the benefits of combining a longer time-frame with comparing several groups of adolescents. Orphanage data allowed to evaluate the growing importance of a vocational education from the end of the nineteenth century, while the militia data enabled a comparison between those with and without a vocational degree. Comparing between different groups also helped to single out the effect of on-the-job training versus vocational training, demonstrating that in terms of wages there were little differences in skills between vocational pupils. Likewise, comparing different groups of pupils with and without a commercial education showed that having a commercial degree mattered relatively more, both in terms of wages and in access to white-collar work.

This thesis has demonstrated how the provision of education adapted to changing conditions in The Netherlands between 1750 and 1920. By doing so it has become apparent that examining the local level can greatly add to our understanding of institutional change. The route towards providing more skilled workers was by and large successful because there was sufficient scope for change at the local level, and also because at the local level interests between politicians, parents, and employers may have aligned relatively easily. Furthermore, using micro-level data and different empirical strategies has forced us to review the method of estimating human capital formation, and the role of schooling for the labour market. Social and economic historians should critically evalu-

ate if all types of education really enhanced skill formation when compared to on-the-job training, or whether they merely eased the transition to the labour market. Using a comparative approach, ideally based on micro-level data, allows to examine this complex link between schools and the labour market for other countries as well, thereby improving our understanding of the link between educational change and economic development.

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Nederlandse samenvatting (summary in Dutch)

De rekening delen: scholing aanpassen aan Nederlandse arbeidsmarkten, 1750-1920

Introduction

De periode van industrialisatie die plaatsvond in West-Europa tussen grofweg de achttiende en de twintigste eeuw kan worden gezien als de belangrijkste economische ommekeer in de geschiedenis. Economische groei in deze periode was niet alleen ongekend, het werd voor het eerst structureel in vergelijking met de voorgaande eeuwen en legde zo de basis voor de welvaart van het heden. De vraag hoe deze industrialisatie precies kon plaatsvinden is daarom één van de centrale vragen binnen economisch historisch onderzoek. In dit proefschrift wordt een zijtak van deze vraag onderzocht, namelijk op welke manier publieke en private partijen in Nederland erin slaagden om de training en scholing van verschillende groepen werknemers aan te passen aan het industrialisatieproces.

Door industrialisatie veranderde de vraag naar werknemers ingrijpend. Zonder gerichte aanpassingen in het onderwijsaanbod konden landen economisch niet aanhaken. Dit gold met name voor landen waar het industrialisatieproces zich later voltrok, omdat kennis en vaardigheden nodig waren voor het overnemen en toepassen van technieken die reeds in het buitenland waren ontwikkeld. Daarom is hier gekozen voor de casus Nederland: een typisch voorbeeld van een late industriële ontwikkelaar. In Engeland, dat als eerste industrialiseerde, werd juist veel geschoold werk vervangen door ongeschoold werk aan bijvoorbeeld de lopende band. In landen die later industrialiseerden zijn er daarentegen aanwijzingen dat juist scholing en training economische vooruitgang bespoedigde. De gebruikte technieken voor productie werden immers steeds ingewikkelder (elektriciteit, gas, petrochemie) en met de opkomst van telegrafie en de uitbreiding van firma's kwam er onder andere meer vraag naar managers en administratieve medewerkers.

Twee partijen konden theoretisch een rol spelen in het aanbieden van scholing en training, namelijk verschillende lagen van de overheid enerzijds en private partijen anderzijds. Het was echter verre van eenduidig hoe beide partijen

onderwijs zouden moeten aanbieden. De overheid was vaak best geneigd om onderwijs aan te bieden omdat dit naast economische effecten allerlei voordelen had, maar had daarbij niet altijd de eisen van werkgevers voorop staan. Daarnaast was het zeker in de lange negentiende eeuw niet duidelijk welke overheid (Rijk of gemeenten) nu het best het voortouw kon nemen in het onderwijsaanbod. Dit kristalliseerde pas echt uit met het einde van de schoolstrijd in 1917, waarmee dan ook de onderzoeksperiode van dit proefschrift eindigt. Werkgevers wilden best scholing aanbieden, maar alleen als ze zeker wisten dat de geïnvesteerde kosten kunnen worden terugverdiend.

Verder speelden afwegingen van ouders een cruciale rol. Stuurden zij hun kinderen na de basisschool langer naar school zodat ze op de lange termijn meer konden verdienen, of werden ze meteen aan het werk gezet om direct geld te verdienen? Deze beslissing werd beïnvloed door de hoogte van schoolgelden en lonen en de mogelijkheden en kosten van leren op de werkvloer. Het succesvol aanpassen van onderwijsvoorzieningen was zo een voortdurend onderhandelingsproces over wie welke kosten zou moeten dragen.

Om deze wisselwerking tussen overheden, werkgevers en ouders te kunnen reconstrueren is gekozen voor een benadering waarbij gepoogd is het effect van institutionele veranderingen in onderwijsaanbod te meten aan de hand van onderwijsgegevens en indicatoren over de arbeidsmarkt waarvoor werd opgeleid. Waar mogelijk is gebruik gemaakt van vergelijkingen over tijd, of tussen groepen leerlingen of werknemers. De komst van de ambachtsschool vanaf het midden van de negentiende eeuw is bijvoorbeeld geëvalueerd door lonen van werknemers met een diploma af te zetten tegen werknemers die op de werkvloer werden opgeleid. Door twee typen hoger onderwijs te vergelijken werd duidelijk wat voor invloed het verstrekken van studiebeurzen had op deelname in het hoger onderwijs en arbeidsmarktinstroom.

In dit proefschrift is de keuze gemaakt om het onderzoek te beperken tot het aanbod van verschillende typen van post-elementair onderwijs. Hiervoor zijn twee redenen. Ten eerste was de Nederlandse bevolking sinds de vroegmoderne periode in hoge mate geletterd en was deelname aan het basisonderwijs al in de negentiende eeuw ongekend hoog. Dit betekent dat basisonderwijs, of het simpelweg kunnen lezen en schrijven, op de arbeidsmarkt geen onderscheidende functie meer had en daarom lastig te onderzoeken is vanwege het grotendeels ontbreken van een controlegroep en omdat een vergelijking van tijdsperioden problematisch is. Ten tweede is dit proefschrift met name geïnteresseerd in de vraag waar specifieke vaardigheden voor de werkvloer werden aangeleerd. Het is aannemelijk dat bijvoorbeeld ambachten zoals timmeren en machinewerken of bedrijfskundige vaardigheden niet al op de basisschool werden verworven. Het proefschrift is daarom onderverdeeld in vier cases waarin onderzoek is

gedaan naar drie typen post-elementair onderwijs: ambachtsonderwijs, middelbaar onderwijs en hoger onderwijs. De eerste casus kijkt naar ambachtsonderwijs voorafgaand aan de Nederlandse industrialisatie en onderzoekt of de afschaffing van de traditionele ambachtsgilden nadelig uitpakte voor de scholing van ambachtslieden in de negentiende eeuw.

Chapter 2. From orphan to artisan: Dutch apprenticeship during and after the guilds

Voorafgaand aan de komst van ambachtsscholen werden vaardigheden vooral opgedaan op de werkvloer, maar het is niet duidelijk wat voor instituties nodig waren om ervoor te zorgen dat opleiden op de werkvloer kon functioneren. Ambachtsgilden worden wel gezien als onmisbare instituties voor het controleren en reguleren van het leerlingstelsel, maar in Nederland werden ze in 1820 opgeheven, enkele decennia voor de industrialisatie. Dit hoofdstuk onderzoekt of ambachtsgilden daadwerkelijk nodig waren voor het functioneren van het leerlingstelsel. Daarmee wordt indirect duidelijk of het afschaffen van de ambachtsgilden de opleiding van geschoolde werklieden tijdens industrialisatie mogelijk nadelig heeft beïnvloed.

Volgens sommige historici waren gilden in de vroegmoderne periode nauw betrokken bij het leerlingstelsel, waarbij een jongeman voor een bepaalde periode op de werkvloer onderwezen werd door een ambachtsmeester. De leerling betaalde de meester voor zijn tijd en opleidingskosten door na zijn training voor een periode tegen een laag loon voor hem te werken. Het argument van deze historici is dat gilden ervoor zorgden dat dit systeem kon functioneren, omdat zij controleerden of de meester wel training gaf en of de leerjongen wel bleef na zijn training. Op die manier liepen beide partijen geen risico. Andere historici stellen daarentegen dat gilden vooral hun lokale monopolie op ambachtsuitoefening in stand wilden houden en enkel uit dit motief het leerlingstelsel reguleerden.

Door unieke gegevens over de leerperiode van weesjongens uit Leiden en Utrecht tijdens de achttiende en negentiende eeuw zijn beide stellingen in detail getoetst. Weeklonen die weesjongens verdienden tijdens hun leerperiode laten zien dat er geen sprake was van twee fasen waarin trainen gevolgd werd door werken. Leerjongens verdienden al een loon vanaf het begin van hun training. Dit loon was relatief laag omdat de meester zijn gemaakte trainingskosten erop in mindering bracht, maar het loon nam toe naarmate de weesjongen meer vaardigheden opdeed. Omdat weesjongens trainingskosten direct ruimschoots compenseerden door het doen van steeds ingewikkelder werk, was het geen

probleem als een weesjongen zijn leerperiode niet uitdiende. Meesters hadden geen investering om achteraf terug te verdienen, waardoor gilden theoretisch niet nodig waren om het leerlingstelsel te coördineren. Niet verrassend waren leertijden dan ook zeer divers en liepen weesjongens eenvoudig weg bij hun meester, of wisselden ze van opleiding. Resoluties van het weeshuis laten zien dat meesters, zoals te verwachten valt in deze omstandigheden, amper klaagden over jongens die wegliepen. Gegevens over niet-weesjongens laten bovendien zien dat deze bevindingen niet alleen golden voor weesjongens, maar zeer waarschijnlijk van toepassing zijn op het gehele vroegmoderne leerlingstelsel ten tijde van de Republiek.

De toegang tot ambachtstraining was tijdens de gilden echter beperkt omdat gildenreguleringen een maximum stelden aan het aantal leerlingen per meester. De data laten zien dat deze regels in Leiden en Utrecht vaak strikt werden nageleefd. In Leiden zorgde dit ervoor dat veel weesjongens aan het werk gezet werden als textielwerkers en pas een ambacht konden leren als er ergens een plek vrijkwam. Dit veranderde drastisch na de afschaffing van de gilden. In de negentiende eeuw hadden weesjongens meer toegang tot ambachtstraining omdat het aantal leerplaatsen per meester werd vrijgegeven en omdat het aantal meesters door de afschaffing van de gilden sterk toenam. Gilden waren dus vermoedelijk niet nodig voor de opleiding van de vroegmoderne ambachtsman en de afschaffing van de gilden lijkt eerder een positief dan negatief effect te hebben gehad op het leerlingstelsel tijdens de negentiende eeuw.

Chapter 3. Schooling for certainty: on-the-job training and vocational schools during Dutch industrialisation, *1860-1920*

Het leerlingstelsel bleef vermoedelijk zonder veel problemen functioneren totdat het industrialisatieproces in Nederland op gang kwam vanaf de tweede helft van de negentiende eeuw. Hoofdstuk drie onderzoekt hoe er tijdens dit industrialisatieproces voldoende geschoolde arbeiders werden opgeleid. Vanaf het midden van de negentiende eeuw werden in steeds meer steden en grote gemeenten ambachtsscholen opgericht om te voorzien in de vraag naar geschoolde werklieden. De vraag is of deze scholen voldoende werklieden opleidden. Dit is benaderd door onder meer te kijken naar lonen en de zogenaamde 'scholingspremie': het verschil tussen de lonen van geschoolde en ongeschoolde werklieden in een bepaalde beroepssector. Een lage scholingspremie wijst erop dat menselijk kapitaal goedkoop beschikbaar is en suggereert dat onderwijs relatief efficiënt werd aangeboden: er zijn immers voldoende geschoolde werklieden beschikbaar.

Uit geraadpleegde arbeidsenquêtes uit de tweede helft van de negentiende eeuw komt naar voren dat er tijdens de Nederlandse industrialisatie een probleem ontstond met het leren op de werkvloer. Door mechanisatie werd een gedeelte van het werk veel eenvoudiger terwijl aan de andere kant geschoold personeel nodig was voor het bedienen, onderhouden en vervaardigen van machines en andere nieuwe productiemethoden. Deze verwijdering leidde ertoe dat het geleidelijk aanleren van vaardigheden voor werkgevers onrendabel werd. Zij hadden immers steeds vaker twee duidelijk gescheiden groepen werknemers. Het werk dat voorheen deze groepen met elkaar verbond - en van het leerlingstelsel een nuttige opleidingsvorm maakte - verdween meer en meer.

Opleidingsgegevens van weesjongens uit Amsterdam tijdens de periode 1877-1902 laten inderdaad zien dat leren op de werkvloer steeds moeilijker werd vanwege het ongeschoolde karakter dat veel ambachtswerk had aangenomen. Bazen gebruikten jongens steeds vaker als goedkope arbeidskracht zonder training te verschaffen en ontsloegen jongens direct zodra er minder werk te doen was. Waar leertermijnen voorheen in jaren werden gemeten moest een weesjongen nu blij zijn als een baas hem een paar maanden wilde aanhouden. Anderzijds liepen veel jongens weg omdat hen niets werd geleerd en omdat ze zwaar en ongeschoold werk moesten verrichten. Het leren van een vak hing steeds vaker af van persoonlijk doorzettingsvermogen en het treffen van net die ene baas die wel training verschafte. Het aantal bazen dat weesjongen bezochten nam schrikbarend toe, terwijl een steeds groter deel van hen helemaal geen vak had geleerd op het moment dat ze het weeshuis moesten verlaten.

Ambachtsscholen, die aanvankelijk door gemeenten werden opgericht en gefinancierd, boden afhankelijk van de plaats verschillende specifieke beroepsopleidingen aan, zoals timmeren, smeden, of machinewerken. Een combinatie van loongegevens uit onderwijsverslagen en weeshuisarchieven laat echter zien dat deze leerlingen geen hoger loon ontvingen dan jongens die op de werkvloer hadden geleerd. Toch hadden deze scholen wel degelijk een ander voordeel. Door beroepen van negentienjarigen uit de periode 1880-1920 te relateren aan hun opleiding is onderzocht of de ambachtsschool een verschil maakte voor beroepstoegang. Deze gegevens werden verkregen door registers van ambachtsscholen te koppelen aan militieregisters van de steden Alkmaar en Breda.

Hieruit wordt duidelijk dat een diploma van de ambachtsschool de toegang tot geschoold ambachtswerk vergrootte en tegelijkertijd de kans op ongeschoold werk sterk deed afnemen. In vergelijking met leren op de werkvloer gaf de ambachtsschool dus veel meer zekerheid. Als leerling kon je enkele jaren geen loon verdienen, maar de schoolgelden van de ambachtsschool waren in ieder geval laag genoeg om veel families uit de (lagere) middenklasse inkomsten te laten opgeven voor een zekerder toekomst.

Afgaande op de scholingspremie lijkt de ambachtsschool adequaat het slechter functioneren van leren op de werkvloer te hebben opgevangen. De scholingspremie daalde vanaf het midden tot het einde van de negentiende eeuw, maar stabiliseerde toen het leerlingstelsel voor veel werkgevers minder praktisch werd. Rond 1918-1920 trad vervolgens een drastische daling van de scholingspremie op. Dit kan erop wijzen dat de sterk stijgende leerlingaantallen van de ambachtsschool, mede veroorzaakt door een verlaging van het schoolgeld, de Nederlandse arbeidsmarkt van meer dan voldoende geschoolde werklieden voorzag. Door ingrijpen van lokale overheden, later aangevuld door subsidies van de Rijksoverheid, werd een mogelijk tekort van geschoolde arbeiders dus afgewend door leren op de werkvloer te vervangen door ambachtsonderwijs in de schoolbanken. Met de Nijverheidswet van 1919 werd deze keuze min of meer definitief en kregen ambachtsscholen recht op structurele financiering van de Rijksoverheid.

Chapter *4*. Accounting for secondary schools: commercial training and the supply of Dutch white-collar workers, *1860-1920*

In dezelfde periode als behandeld in hoofdstuk 3 nam in Nederland de vraag naar personeel in de dienstensector ongekende vormen aan. De komst van stoomschepen, de groei van internationale handel, het verzekeringswezen en de algemene uitbreiding van de dienstensector maakten dat er steeds meer personeel nodig was op kantoor, banken en in de handel. Dit hoofdstuk onderzoekt hoe werd voorzien in deze sterk stijgende vraag naar personeel door middel van data over schooluitstroom, lonen van verschillende typen kantoorpersoneel en opnieuw schattingen van de scholingspremie. Omdat er gradaties bestonden in het personeel binnen de dienstensector is een onderscheid gemaakt tussen de opleiding van geschoold personeel en laaggeschoold personeel.

Hooggeschoold personeel voor de dienstensector zou volgens minister Thorbecke worden voorzien door het invoeren van de Hoogere Burgerschool (HBS) in 1863. De uitstroomcijfers en data van de Historische Steekproef Nederland laten echter zien dat een groot deel van HBS leerlingen naar de universiteit ging en ook daarna niet in private kantoren of in de handel terecht kwam. Schattingen aan de hand van beroepstellingen wijzen uit dat de HBS niet voldoende personeel aanleverde voor het hooggeschoolde segment van de dienstensector en al helemaal niet voldoende bijdroeg aan het opleiden van het laaggeschoolde gedeelte.

Net als bij de ambachtsschool namen stads- en gemeenteraden vanaf het laatste kwart van de negentiende eeuw het initiatief om handelsscholen op te

richten om in deze lacune te voorzien. Data uit jaarlijkse gemeenteverslagen wijst uit dat deze scholen inderdaad een belangrijke bijdrage leverden aan het opleiden van hooggeschoold personeel voor de dienstensector. Voor het lagere segment werden, ook door lokale besturen, handelsavondscholen opgericht. Deze werden snel ongekend populair vanwege (wederom) de lage schoolgelden en omdat leren in de avonduren gecombineerd kon worden met kantoorwerk overdag.

Lonen en personeelsgegeven uit bedrijfsarchieven bevestigen het beeld van succesvol ingrijpen op lokaal niveau. De Nederlandsche Handel-Maatschappij, 's lands grootste internationale handels- en financieringsonderneming en de indirecte opvolger van de VOC, nam vanaf het einde van de negentiende eeuw voornamelijk geslaagden aan van de handelsschool. Zij ontvingen daarnaast significant hogere lonen dan hun collega's met een ander diploma. De algemene loontrend van deze firma laat zien dat de toename in personeel met een handelsdiploma correleerde met een daling van de reële lonen, terwijl de lonen juist een opgaande trend lieten zien voorafgaand aan de oprichting van handelsscholen. Opvallend is ook dat het loonvoordeel voor personeel met een handelsdiploma geleidelijk aan verdween, wat verder suggereert dat de firma op den duur kon kiezen uit voldoende hooggeschoolde sollicitanten.

Hoewel er vrijwel geen gegevens bestaan over het opleidingsniveau van laaggeschoold personeel in de dienstensector konden wel loongegevens worden verzameld, namelijk van de Amsterdamse Bank van Lening en van de Associatie Kassa. De functiebeschrijvingen maken duidelijk dat het personeel van beide firma's minder geschoold was dan dat van de Nederlandsche Handel-Maatschappij. Bij beide firma's stegen de reële lonen sterk tot aan circa 1900, zeer waarschijnlijk omdat er te weinig aanbod was. Vermoedelijk vanwege de grote vraag wisselde kantoorpersoneel vaak van werkgever en waren veel nieuwe personeelsleden afkomstig uit andere beroepssectoren.

Rond 1910 daalden de reële lonen echter en werd wisselen van werkgever zeldzamer. Tegelijkertijd verdween de functie 'leerling' bij de Bank van Lening, wat doet vermoeden dat nieuw personeel reeds voldoende geschoold was en niet meer op de werkvloer hoefde te worden opgeleid. De scholingspremie voor deze groep van kantoorpersoneel daalde bovendien sterk na 1910. Al deze ontwikkelingen gingen samen met de sterke groei van deelname aan het handelsavondonderwijs, wat erop lijkt te wijzen dat er door deze onderwijsuitbreiding meer dan voldoende kantoorpersoneel voorhanden was.

Net als bij de ambachtsschool werd een knelpunt in onderwijsaanbod dus allereerst opgelost door lokale overheden. Lokale handels(avond)scholen vulden de lacune op die de HBS ongewild achterliet en droegen zorg voor de opleiding van voldoende personeel voor de dienstensector. Ook hier werden deze lokale

initiatieven uiteindelijk overgenomen door de Rijksoverheid. In de jaren 1920 werd de HBS geleidelijk omgevormd in twee typen, waarbij de HBS-A een groot deel van het curriculum van de handelsscholen overnam. Omdat handelsscholen minder Rijksfinanciering kregen verdwenen ze vervolgens uit het onderwijssysteem.

Chapter 5. The power of the purse: student funding and the labour market for Dutch Reformed and Catholic theology students, *1800-1880*

Met de komst van de industrialisatie veranderde ook de vraag naar universitair personeel, zoals ingenieurs en andere technici. Hiervoor werden nieuwe opleiding ingericht. Anderzijds is uit de literatuur bekend dat juist de traditionele professies als jurist, theoloog en arts in de negentiende eeuw te lang door overheden werden gestimuleerd, waardoor een overschot ontstond aan beroepsgroepen waar eigenlijk minder vraag naar was. Vanwege het gebrek aan een controlegroep - alle professies werden aan de universiteit onderwezen - is het lastig om te onderzoeken in hoeverre dit overschot aan universitair opgeleiden te wijten was aan hoger onderwijsbeleid. Voor theologen is dit echter wel mogelijk, omdat pastoors voor de Katholieke Kerk werden opgeleid in regionale seminaries en Hervormde predikanten een universitaire graad moesten hebben. Door beide groepen te vergelijken onderzoekt dit hoofdstuk hoe de manier van studentenfinanciering bijdroeg aan de afstemming van vraag en aanbod naar hoger opgeleiden. Daarmee wordt ook duidelijk welk niveau van organisatie (centraal of regionaal) gunstiger was voor het bereiken van afstemming tussen vraag en aanbod op de arbeidsmarkt.

Door een nieuwe hoger onderwijswet van 1815 (*Organiek Besluit*) werd studeren van theologie aan de universiteit plotsklaps duurder. Door lobbyen van de Hervormde Kerk werden de studiekosten voor theologie echter al rond 1820 afgeschaft en werd het aantal studiebeurzen opgevoerd, met name voor zonen van predikanten. Doordat deze maatregelen te lang werden doorgevoerd en omdat tegelijkertijd een groot aantal private beurzen beschikbaar was, ontstond er een ongekend overschot aan kandidaten voor predikantsplaatsen. Hoewel een theologische studie aan de universiteit hierdoor toegankelijk werd voor de middenklasse, konden veel studenten na hun afstuderen geen predikantspositie of andere baan bemachtigen.

De Katholieke Kerk financierde haar seminaries uit lokale bisdommen en vicariaten, waardoor er een kortere lijn bestond tussen de opleiding van pastoors en de vraag naar pastoors. Een reconstructie van het studiefinancieringsbeleid van verschillende regionale seminaries laat opmerkelijke verschillen zien

met dat van universitaire studenten theologie. Het verlagen van studiekosten en het verstrekken van studiebeurzen werd hier juist gedaan om getalenteerde studenten verder aan te moedigen en niet simpelweg om instroom (nodeloos) te bevorderen. Het verstrekken van beurzen was in tegenstelling tot studenten theologie niet verspreid over allerlei stichtingen en de Rijksoverheid, maar gecentreerd binnen de regionale seminaries. Hierdoor konden beurzen worden gebruikt om ervoor te zorgen dat voldoende getalenteerde studenten beschikbaar waren om de opengevallen pastoorsposities in te vullen. Personeelsgegevens van pastoors en kapelaans uit katholieke almanakken laat inderdaad zien dat er gedurende de hele negentiende eeuw een nagenoeg perfecte afstemming was tussen vraag en aanbod op deze arbeidsmarkt, die nauwgezet de toename in het officiële aantal rooms-katholieke gelovigen volgde.

De studiefinanciering van theologiestudenten door de Rijksoverheid in de negentiende eeuw heeft zo paralellen met vandaag de dag, waar voor bepaalde studies ook grote overschotten zijn gecreëerd doordat de toegang relatief groot is. Als afstemming met de arbeidsmarkt voorop staat laat dit hoofdstuk zien dat het organiseren van onderwijs op regionaal niveau in de negentiende eeuw duidelijke voordelen had ten opzichte van het centraal coördineren van universiteiten. In zekere zin correspondeert dit met de bevindingen van de vorige hoofdstukken, waar onderwijsvernieuwingen van lokale overheden ook bijdroegen aan een betere afstemming tussen vraag en aanbod op de arbeidsmarkt.

6. Conclusion

Dit proefschrift draagt bij aan een beter begrip van institutionele onderwijsveranderingen. Het relatief decentrale karakter van besluitvorming in Nederland, als erfenis van vroegmoderne periode, gaf stads- en gemeenteraden relatief veel mogelijkheden om onderwijs aan te passen. Van deze mogelijkheden is uitgebreid gebruik gemaakt. Lokale overheden in Nederland hebben in vrijwel alle gevallen relatief succesvol het onderwijsaanbod afgestemd op veranderende arbeidsmarkten tijdens de negentiende eeuw. Lokale overheden waren daarnaast in staat om onderwijshervormingen van de Rijksoverheid te corrigeren als deze nadelig uitpakte, zoals het geval was bij de HBS voor de dienstensector. Wanneer nationaal onderwijsbeleid niet van onderop gecorrigeerd kon worden lijken de gevolgen bovendien nadelig te kunnen zijn geweest, zoals hoofdstuk vijf heeft laten zien. Niet zonder reden werden dan ook alle onderwijshervormingen van lokale overheden uiteindelijk overgenomen door de Rijksoverheid vanaf de jaren 1920. Het lijkt daarom gerechtvaardigd om toekomstig onder-

zoek naar onderwijs tijdens de lange negentiende eeuw met name te richten op besluitvormingsprocessen op lokaal niveau en niet enkel op nationale onderwijshervormingen, zoals nog vaak het geval is.

De hoofdstukken maken verder duidelijk dat onderwijshervormingen nauw samenhingen met de kostenafwegingen die werkgevers maakten over de opleiding van hun personeel. Leren op de werkvloer is daarom een integraal onderdeel van onderwijsgeschiedenis en economische geschiedenis. In veel studies over het verband naar menselijk kapitaal en economische groei wordt echter vooral gekeken naar indicatoren van formeel onderwijs, zoals geletterdheid en het aantal jaren genoten formeel onderwijs. In dergelijke studies worden schattingen over de omvang van leren op de werkvloer veelal weggelaten, terwijl dit proefschrift juist laat zien dat deze onderwijsvorm tot ver in de negentiende eeuw verantwoordelijk was voor de opleiding van het overgrote deel van de geschoolde beroepsbevolking. Bovendien zijn formeel en informeel onderwijs de ene keer complementair maar de ander keer substituerend. Dit betekent dat een nauwkeurige evaluatie van de positie van leren op de werkvloer deel zou moeten uitmaken van het onderzoek naar de vorming en omvang van menselijk kapitaal in het verleden. Alleen op die manier kunnen we tot een meer gewogen oordeel komen over de rol van onderwijs in economische ontwikkeling.

Op methodologisch gebied heeft dit proefschrift laten zien dat onderwijsgeschiedenis en economische geschiedenis baat kunnen hebben bij het structureel benutten van vergelijkingsmogelijkheden, die zijn gericht op institutionele breukpunten. Hoofstuk één liet bijvoorbeeld zien dat er veel te winnen valt bij het doorbreken van de grens tussen de vroegmoderne en de moderne periode. Waar veel historici zich in het onderzoek naar gilden vooral richten op de vroegmoderne periode, kon het effect van een breukpunt in onderwijsaanbod simpelweg worden geëvalueerd door dezelfde groep jongeren te volgen tijdens en na het bestaan van ambachtsgilden. Het effect van insitutionele verandering kan ook worden onderzocht door verschillende groepen jongeren met elkaar te vergelijken na een verandering in het onderwijsaanbod en daarbij gebruik te maken van zoveel mogelijk consistente gegevens. Zo zijn bijvoorbeeld personeelsarchieven geraadpleegd en loondata vergeleken om te onderzoeken of een diploma daadwerkelijk arbeidsmarktkansen vergrootte.

In deze gevallen werd duidelijk dat een diploma significant de kans op bepaalde beroepen verhoogde ten opzichten van sollicitanten zonder diploma, maar ook dat een diploma niet in alle gevallen gepaard ging met een hoger loon. Dit roept de vraag op wat formeel onderwijs dan precies deed voor werknemers, namelijk of het daadwerkelijk de productiviteit verhoogde of vooral een signaleringsmiddel was. Dergelijke vragen konden in dit proefschrift nog niet worden beantwoord, maar duidelijk is dat in beide gevallen deze toename van

certificering van vaardigheden bijdroeg aan een daling van de selectiekosten voor werkgevers.

De benadering die hier is toegepast - het evalueren van onderwijsveranderingen door groepen te vergelijken op basis van nieuwe gegevens over individuele leerlingen en studenten - leidt zo tot een beter begrip van historische onderwijsaanpassing. Aanpassingen op het lokale niveau zijn belangrijker geweest voor het succesvol aanpassen van onderwijs aan de arbeidsmarkt dan tot nu toe is aangenomen. Dergelijke bevindingen zijn ook gevonden voor onderwijsontwikkelingen in de Verenigde Staten tijdens de negentiende eeuw, waarmee verder het vermoeden wordt bevestigd dat vergelijkend onderzoek naar het lokale niveau onmisbaar is voor het begrijpen van de afstemming tussen onderwijs en arbeidsmarkt in het verleden. Gezien het belang dat aan onderwijs wordt toegekend in historisch onderzoek naar economische ontwikkeling, is het te hopen dat deze benadering zal worden herhaald voor meerdere landen en andere perioden.

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About the author

Ruben Schalk was born in Nieuwegein, The Netherlands, on December 2nd, 1984. After completing his prescience education (VWO) at the Oosterlicht College in Nieuwegein, and a gap-year, he started to study History at Utrecht University. After obtaining a Bachelor degree he enrolled in the Research Master 'History: Cities, States and Citizenship' at the same university, during which he spent a semester at the University of Exeter in England. While doing archival research for his Master thesis on how entrepreneurs in seventeenth-century Enkhuizen acquired credit and financed their enterprises, he discovered the 'world's oldest share' issued by the Enkhuizen chamber of the Dutch East India Company (VOC). He obtained his Master degree with distinction (*cum laude*) in 2010, and was employed to prepare a proposal for a PhD project afterwards. In 2011 he obtained a position as PhD candidate in a collaborative research project with the universities of Leiden and Groningen on the history of study grants, which resulted in this thesis. In the spring of 2014 he spent a semester as visiting PhD candidate at the London School of Economics and Political Science. As of August 2015 he is employed as lecturer, and as postdoctoral researcher in the bEUcitizen research project 'Historical Development of Citizenship', at Utrecht University.

List of publications

R. Schalk, 'The power of the purse: student funding and the labour market for Dutch Reformed and Catholic theology students, 1800-1880', *History of Education* 44 (2015), pp. 131-155.

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