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The impact of sectoral shifts on Dutch unmarried women's labor force participation, 1812–1929

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During the nineteenth century, Dutch female labor force participation (FLFP) was relatively low. Most scholars argue that social norms and rising wages were driving this development. However, their conclusions principally apply to married women. We study unmarried women's LFP (UFLFP) and investigate a third driver: shifting sectoral employment shares. We include all three drivers in a logistic regression based on nearly 2 million marriage records from 1812 to 1929. We conclude that social norms and income levels mattered, but that shifting sectoral employment shares were driving the decline in UFLFP because sectors with low demand for female laborers expanded.

1. Introduction

During the nineteenth and early twentieth centuries, regular female labor force participation (FLFP) decreased in Western Europe.[1] In the Netherlands, the share of the enumerated women in censuses that were listed with an occupation was particularly low during this period. Moreover, this share decreased from 24 percent in 1850 to 15 percent in 1890, and only slightly recovered to 18 percent in 1920 (table 1). Most studies on the relatively low and decreasing levels of Dutch FLFP have concluded that changing social norms regarding domesticity and rising men's wages lay at the heart of this development (Plantenga 1993; Pott-Buter 1993; van Zanden and van Riel 2004; van Poppel *et al.* 2009). Hettie Pott-Buter concluded, based on a comparative study of seven European countries, that "[i]t is obvious that differences between the Netherlands and the other six countries are closely related to low labor force participation rates of married women, the dominance of bourgeois family ideals, and high fertility rates" (Pott-Buter 1993, p. 321). More recent studies also emphasize the importance of such family ideals, arguing that households' increasing desire for a breadwinner–homemaker household—in which the husband was the sole wage earner and the wife was a housewife—drove the decline in FLFP (van Poppel *et al.* 2009). Although the spread of domesticity may have intensified the homemaking duties of unmarried women too, this supply-side constraint arguably weighted more heavily on married women (You 2019, pp. 12–8). In this study, we focus on adult unmarried women's LFP (UFLFP), identifying the factors that drove the notable decline for this relatively large, but largely underexplored group of women.

Next to income and social norms, we incorporate a third, underexplored driver of FLFP: shifting sectoral employment shares. The Dutch economy industrialized late compared to

[1] Women that only performed irregular, seasonal, or casual work were usually not recorded as working in occupational censuses (You 2019, pp. 4–5).

surrounding countries such as Belgium and the United Kingdom (de Jonge 1976; Griffiths 1979; Horlings and Smits 1997; Jansen 1999; Mokyr 2000). During the 1860s, industrialization eventually took off thanks to "the accelerated integration of the domestic market, the revival of agriculture, and the shifting ratios between the costs of coal and steam-driven machinery and that of labor" (van Zanden and van Riel 2004, p. 295). Still, the share of the total labor force (all men, women, and children) that worked in industry was relatively small by the start of the twentieth century (table 2). Instead, 30 percent worked in agriculture, as opposed to 23 percent in Belgium and 12 percent in the United Kingdom. The share of employment in services increased due to the growth of commercial services (i.e., transport, wholesale, and retail).

We explore the relative impact of social norms, income, and sectoral employment shares on UFLFP based on 1,849,608 Dutch marriage records from the period 1812–1929, covering seven out of the eleven Dutch provinces.[2] We include women from the age of 16, because this was the minimum age of marriage for women since 1838 (van Poppel 1992, p. 32). Based on whether or not the bride stated an occupation in her marriage record, we determine the extent of UFLFP, which decreased considerably from over half in the early nineteenth century to circa 15 percent in the 1920s.[3] We run a logistic regression to estimate how, among other variables, the occupational status of the groom, the age of the bride, and local labor market structures have affected the development of UFLFP. The wide coverage of the data source, across both time and space, permits a long-term analysis of UFLFP at the municipal level. The results help us to quantify what was driving the decline in UFLFP in the Netherlands over the long nineteenth century. For this we utilize a novel decomposition framework. This decomposition shows that, even though we cannot discount the effect of "social norms" on UFLFP completely—as they are particularly difficult to quantify—shifting sectoral employment shares appear to have had a far greater impact on the decline in UFLPF.

We conclude that the particular changes in the Dutch economic structure provided few employment opportunities for women, except in certain regions where UFLFP far exceeded the national average, such as the textile regions in the eastern provinces. The expansion of sectors with low demand for female laborers could thus be an important cause of the relatively low and declining Dutch UFLFP (as well as total FLFP) in a European context.

Our methodology is directly applicable to research on (U)FLFP in other countries. Birth, marriage, and death certificates (in short, civil registration) are available for most European countries, albeit from different moments in time. National civil registry was adopted in France in 1792, in Belgium in 1796, in "[...] England and Wales in 1837, Scotland in 1855, Ireland in 1864, Romania in 1865, Italy in 1866, and Spain, Germany, and Switzerland in the 1870s" (Mourits 2019, p. 10). The temporal and international comparability of these sources allow for large-scale comparative research on the forces that have shaped the trajectory of UFLFP.

[2] The Dutch marriage records have been digitized for the LINKS project. The aim of this project is to link information from three life cycle moments (birth, marriage, and death) to reconstruct family lives. We thank Kees Mandemakers for providing access to the database (released in 2014) with marriage records of seven Dutch provinces for the period 1812–1929. The marriage records of the remaining four provinces are currently being digitized or not yet available. See https://iisg.amsterdam/en/hsn/projects/links.

[3] We acknowledge that the marriage records provide us with a lower-bound estimate of the number of working unmarried women because brides could choose not to state an occupation while they did have one (see Section 4). Consequently, we cannot be certain that our results reflect labor force participation of unmarried women, since we are actually measuring the occupational status. We nevertheless utilize the term FLFP, as this is a commonly used term in the literature on women's work. Most of such studies use sources that measure occupational status as well.

Table 1. *FLFP in western Europe (female labor force as a percentage of the total female population)*

Year	*Belgium*	*Germany*	*United Kingdom*	*The Netherlands*
1850	38		30	24
1860	36		28	18
1870	36		28	
1880	34	24	25	
1890	29	25	27	15
1900	29		25	17
1910	25	30	26	18
1920	21	35	26	18
1930	24	34	27	19

Note: the years shown in the table are not always the exact years in which the census was conducted. Source: Pott-Buter (1993, p. 21).

Table 2. *Employment by sector in western Europe (percentage share of the total labor force)*

Belgium			
Year	Agriculture	Industry	Services
1846	46	36	18
1866	40	39	20
1890	27	43	30
1910	23	47	31
United Kingdom			
Year	Agriculture	Industry	Services
1851	31	40	29
1871	22	42	36
1891	16	43	41
1911	12	44	45
The Netherlands			
Year	Agriculture	Industry	Services
1849	40	31	29
1870	39	31	30
1889	37	32	32
1909	30	34	35

Sources: (van Zanden and van Riel 2004, p. 192; Feinstein 1976, p. T131; Mitchell 1988, p. 104)

2. Structural change and UFLFP

The decreasing FLFP rates in Western Europe (table 1) have been explained by the spread of the breadwinner–homemaker type of household labor division from the higher to the lower societal classes. This specialization within the household economy was driven by changing consumer aspirations, which shifted towards commodities that could not directly be purchased in the market, such as cleanliness, coziness, and good nutrition, in short:

domesticity. The most logical way for households to produce these commodities was to redirect the labor input of the wife from market work to domestic work (de Vries 2008). Housewives were thus an important aspect of this type of consumer behavior. Because men's real wages increased during the later stages of industrialization, it became possible to relinquish the wife's income and to live in accordance with those norms (Plantenga 1993). Indeed, in the Netherlands after 1850, men's nominal industrial wages started to rise after a long period of stagnation and the costs of living decreased considerably. Consequently, real wages doubled during the period 1850–1913 (Vermaas 1995; Allen *et al.* 2011).

The domesticity norm has also been brought forward as an important driver of the decreasing LFP of unmarried women. Frans van Poppel, Hendrik van Dalen, and Evelien Walhout have studied marriage records to investigate UFLFP and show that the share of brides with a listed occupation decreased during the nineteenth and early twentieth centuries. They conclude that the increasing pressure from the domesticity norm—and not childbearing, child rearing, or the level of the husband's income—was the root cause of the decreasing share of brides with an occupation (van Poppel *et al.* 2009). After all, an increasing share of women quit their job before they got married, thus before they were expected to take care of their own households. Van Poppel *et al.* further argue that many brides chose not to state an occupation even though they did have one, only to live up to society's expectations and that therefore, "[. . .] to keep up appearances, they substituted registered work for unregistered work (for example, in cottage industries, or working in the family firm or on the farm)" (van Poppel *et al.* 2009, p. 124).

However, in light of the domesticity norm, there were also arguments that advocated unmarried women's (wage) labor. Working as a domestic servant was seen as a good preparation for married life and earning a wage could provide women with premarital savings (Janssens 2014, pp. 91, 101). Thus, if a bride listed an occupation on her marriage certificate, this did not necessarily conflict with what society expected of her during married life. Moreover, the domesticity norm mainly explains changes in the supply of female labor and does not tell us much about the effects of labor demand. In the more recent British literature, in particular, much attention has been paid to the impact of local labor market structures and demand for labor on FLFP. Humphries and Sarasúa have argued that "[. . .] supply-side factors, such as marital status and number and age of children, which are conventional determinants of women's decision to enter the labor force, appear to have been less prominent in historical contexts. Instead, women responded to opportunities; the demand for labor was decisive" (Humphries and Sarasua 2012, p. 44). Joyce Burnette has shown that in British regions where large textile factories were built, demand for female labor intensified. In contrast, demand declined in other regions because of the disappearance of hand spinning, work that had provided many women with an income in pre-industrial times. "Women's work opportunities, then, depended on the state of the local economy" (Burnette 2008, p. 44).

Xuesheng You explores the effects of demand- and supply-side factors on FLFP in relation to each other. Based on the 1881 census enumerators' books, he demonstrates that virtually everywhere in England and Wales, the absolute level of married women's LFP was lower than the LFP of unmarried women, but that "relative spatial patterns of female LFPRs were largely the same across different marital groups" (You 2019, p. 7). Thus, regions with relatively high levels of UFLFP generally also had high levels of married women's LFP. Furthermore, based on life stage analysis, he shows the clear supply-side effects of having children: FLFP rates decreased during the first stages of the life cycle when children were born, but increased again once the first child entered the labor market. However, for all life stages, FLFP rates were structurally higher in cotton areas than in mining areas, which again illustrate the

importance of local demand for labor. You concludes that demand for female labor was the most important driver of FLFP rates and that supply-side factors only played a role within the restrictions created by labor demand.

These studies on British FLFP make a strong case that if women did not work, it was primarily because they could not find employment and not because they did not want to work. In the literature on Dutch women's labor history, the impact of changing labor market structures has remained underexplored. This is, however, an important factor to consider because the Dutch economy followed a rather different development path (table 2). Industrialization took off much later than in surrounding countries such as the United Kingdom and Belgium. This industrial retardation was a result of the focus on export trade during the early modern period. When the Netherlands lost most of its export markets during the eighteenth and early nineteenth centuries, it was left with a small domestic market in which mechanization was not cost-effective.[4] This changed during the second half of the nineteenth century, when the demand for industrial consumption goods increased as a result of rising real wages (Smits 1999, pp. 18–9). The textile industry was among the first to mechanize with the spread of steam-driven spinning machinery during the 1860s. Also, the printing, diamond, paper, brewing, and tobacco industries expanded during this early period of industrialization (van Zanden and van Riel 2004, p. 295).

The Dutch agricultural sector was still relatively large in the early twentieth century (table 2). During the first half of the nineteenth century, the number of wage laborers had increased relative to independent farmers. After 1880, a process of de-proletarianization started as small farms—that relied heavily on the labor input of family members—gained importance at the expense of large-scale farms (van Zanden 1985). In services, especially the transport sector prospered after 1880 when several shipping companies were founded in response to the opening of the Suez Canal (van Zanden and van Riel 2004, pp. 306–8).

Men were affected differently by these sectoral shifts than women. Table 3 shows the relative share of male and female laborers in the three major sectors, as listed in the occupational censuses of 1849, 1889, and 1909. Male laborers were spread over the different sectors more equally than female laborers. By 1909, over half of all working women had taken up a job in the services sector. Women took up only a few professions, most notably in the manufacturing of clothing and cleaning (12 percent in 1909) and domestic service (34 percent). Most of the sectors that expanded quickest after 1850 in terms of employment—such as metal, shipbuilding, and transport—employed only a limited number of women.[5] Thus, shifting sectoral employment shares, which were often specific to the region, could have substantial positive as well as negative effects on the demand for female labor.

There was a strong interaction between the demand for and supply of labor, and demographic factors such as age at marriage, fertility, and migration. Apart from age at marriage, these factors will not be incorporated in our model, but it is worthwhile to briefly consider them based on existing literature. Angélique Janssens has shown for two cohorts of Dutch women in the period 1880–1960 that women's labor market activities, age at marriage,

[4] This is a simplification of a complicated interaction of factors that were responsible for the Dutch industrial retardation. Many studies have been conducted on this development. See for the most recent publication on this topic: van Riel (2018).

[5] The number of working women was underestimated in the censuses, especially in agriculture (van Nederveen Meerkerk and Paping 2014). The decreasing share of women workers in agriculture as shown in table 3 might thus be somewhat misleading.

Table 3. *Male and female employment structures in the Netherlands, 1849-1909 (percentage share)*

Men			
Year	Agriculture	Industry	Services
1849	37	36	25
1889	35	37	26
1909	30	39	29
Women			
Year	Agriculture	Industry	Services
1849	47	17	36
1889	38	15	47
1909	29	19	52

Note: shares do not add up to 100, casual labor is excluded from the table. Source: Smits et al. (1999, pp. 112-4).

and fertility behavior were closely linked. She finds that female factory laborers married at a relatively young age because their income enabled them to become independent from their parents early in life. Furthermore, once married, their experience in the factory had empowered them to restrict their fertility for which they needed to negotiate with their husbands. (Former) female factory laborers were thus leading the fertility transition in the Netherlands. Domestic servants, on the other hand, married at a later age and had higher fertility rates during their married lives (Janssens 2014, pp. 247–8). Paul Atkinson argues in a similar vein for the case of England (1860–1920) that "[. . .] where women were most engaged in paid work, they were most likely to limit family size" (Atkinson 2012, p. 159) and that mean age at marriage was relatively high in places with high demand for female labor. Janssens' and Atkinson's conclusions are somewhat contradictory regarding the effects of demand for labor on age at marriage, but both clearly illustrate the tight link between local labor markets and women's fertility behavior.

Demand for labor was also driving the vast rural–urban migration flows in industrializing Europe, along with other variables such as the distance between the place of origin and the (possible) destination, and the social network of the migrant. You (2019) has shown that places with high FLFP rates also had large female net migration, i.e., many more women immigrating than emigrating. Other pull factors were marriage possibilities and the attractiveness of living in an urban setting. You further explores how female migration has affected FLFP rates by counterfactual analysis, deducting the female immigrants from and adding the female emigrants to the observed female population. He finds that "[. . .] there is still a remarkable similarity between the relative spatial pattern of the counterfactual female FLFPs and that of the observed ones" (You 2019, p. 24), which illustrates the crucial role of demand for labor.

These studies show that there was an important interaction between demand for labor and demographic factors, but that the former was decisive. People in general, and women in particular, adapted their age at marriage, fertility, and place of residence to local labor market structures.

3. Demand for female labor in the textile and peat industries

Before exploring the impact of local labor markets on Dutch UFLFP based on quantitative evidence, we will show that personal accounts from labor surveys conducted in 1890 support our argument as well. The labor surveys were carried out to investigate whether the 1889 labor law—that limited women's and children's working days to eleven hours and prohibited their night and Sunday labor—was lived up to. Furthermore, the survey conductors wished to gain insight into the working and living conditions of the working class. To this end, hundreds of people from all social classes and from all regions of the country were interviewed about their work and incomes.[6] We use the interviews from the industrial textile region of Twente and the rural peat regions in the northern provinces to illustrate how individual people experienced the changing demand for labor.

During the nineteenth century, the textile industry of Twente—the heart of Dutch cotton textiles production—increasingly mechanized, which had a profound effect on the demand for labor and the gendered division of labor. For instance, in 1830 when the flying shuttle was introduced (a device that significantly reduced the physical strength needed to operate a loom), weaving became a sex-integrated profession whereas it had been predominantly male in pre-industrial times. Spinning on the other hand had been a female profession but was largely taken over by men when production was relocated from homes to factories. Women were not driven out of the spinning profession, but only operated specific types of machines. For instance, in the Nederlandse Katoenspinnerij (Dutch Cotton Spinning Mill), throstles were exclusively operated by women and self-actors by men. During the second half of the nineteenth century, the number of self-actors increased and therefore the demand for male spinners did too. Around 1905, the balance between male and female workers changed again when the ring spinning machine was introduced, meant to be operated by women. The extent of the demand for male and female laborers thus depended for an important part on the type of machinery in use (de Groot 2001; de Groot 2002).

The demand for female labor in the textile industry was further influenced by the gradual disappearance of the home industry. For the case of England, Humphries and Sarasúa show that the increasing number of women working in factories did not necessarily mean increasing aggregate employment: hand-spinning died out as a result of the factory system and many households lost this source of income (Humphries and Sarasua 2012, p. 58). In Twente too, the home industry lost importance, but did not disappear until at least the first decades of the twentieth century: the 1890 labor surveys reveal that most textile producers outsourced several parts of the production process to home workers, such as sewing sacks and bundling yarn. A producer from Almelo commented, "I let married women do this [bundling yarn], who gladly want to perform some work at home to earn a little extra. They earn *f*2,50–4 per week, depending on household tasks: the larger the household, the less time they have for extra work" (Arbeidsinspectie 1890a, p. 241).

Women's earnings often were a substantial addition to the household income. Most respondents in the labor survey agreed that women and children worked because their husbands' and fathers' wages were not high enough to make ends meet (Arbeidsinspec-

[6] For a more in-depth discussion about this source, see Boter (2017) and Smit (2006). These accounts did not always distinguish between unmarried and married women, but they do give a general impression of how local labor market structures affected FLFP in general.

tie 1890a, pp. 33–6, 51). As producer Jan Blijdenstein put it: "[i]t would not be advisable to deny women to work, if they deem their labor beneficial for their families. [...] The household's interests could make the wife's wage labor necessary. Generally, she does not desire to work" (Arbeidsinspectie 1890a, p. 44). Still, attitudes towards married women's factory labour were mostly negative: their children would be neglected, their houses would be in chaos and this would, according to most contemporary observers, drive their husbands into the nearest pub. Perceptions about unmarried women's factory labor were more heterogenous. Some respondents stated that factory girls could never learn how to become decent housewives (Arbeidsinspectie 1890a, p. 437) while others emphasized the importance of premarital savings which they could accumulate by factory work (Arbeidsinspectie 1890a, p. 153).

In the peat industry, the impact of changing demand for labor on female workers was also apparent. Peat production—the extraction and drying of decayed vegetation used as fuel and building material—was prevalent in the northern provinces. It was especially important during the nineteenth century, when extraction rapidly intensified before being displaced by coal as fuel around the turn of the twentieth century. Annually, April to July were the most labor-intensive months when apart from the permanent laborers living on the peat soils, casual laborers from surrounding regions were drawn there by the beneficial (seasonal) employment opportunities. There was clear gender segregation in the peat industry. Men cut the peat from the soil while women were in charge of the drying process (Gerding 1995, p. 35). Women were also involved in transporting the dried peat to ships. Thus, as in the textile industry, women formed a considerable part of the labor force. In the 1890 survey, a peat producer mentioned that "[w]omen working along is the rule rather than the exception. [...] Perhaps this is a questionable matter as her housekeeping will not improve. However, if she is tough and swift, she will manage to hold everything together" (Arbeidsinspectie 1890b, p. 18). In fact, in most households, wives needed to work in order to make ends meet.

As peat deposits were depleted and competition from coal as fuel intensified, overall demand for labor in the peat regions decreased. A doctor from a peat region where unemployment was a serious problem mentioned in 1890: "[t]here is little work and much unemployment. Consequently, women remain at home" (Arbeidsinspectie 1890b, p. 82). This comment implies that, at least in the peat industry, women were the first to lose their jobs in times of low labor demand.

In both Twente and the peat regions, married as well as unmarried women's earnings were still a valuable addition to the household income around 1900, and local labor market structures determined if and how they could find suitable employment. At the same time, it is clear that married women's labor—at least labor outside the house—was usually frowned upon in light of the increasingly pressing domesticity norm. This was not necessarily the case for unmarried women. Thus, the ideal of a male breadwinner family was widespread, but this did not preclude women from generating an income. If there was enough work, women—both unmarried and married—were working.

In the following sections, we will show that our argument that shifting sectoral employment shares were determining the trajectory of UFLFP also holds up to quantitative scrutiny. We include the drivers discussed above—social norms, income, and economic structures—into one analytical framework, accounting for variation over time within municipalities. The very regionally specific development of Dutch labor markets allows us to empirically test the relative importance of the rise and decline of different sectors in depressing or strengthening UFLFP rates.

4. UFLFP in the marriage records

The primary sources for our analysis are the Dutch marriage records from 1812 to 1929. In 1811, the Code Napoleon—the French civil code established by Napoleon I—was implemented in the Netherlands. It ordered that all municipalities register births, marriages, and deaths in the exact same way. In 1838, the Code Napoleon was replaced by the Dutch Civil Code but virtually nothing changed in the composition of civil records (van Sonsbeek 2005, pp. 14–5). Marriage records in the entire country had to contain information about (1) the place where the marriage took place; (2) the age, occupation, date of birth, and place of birth of the bride and groom, and their parents; and (3) the name, age, and occupation of the witnesses, and their relation to the bride and/or groom. The clerk who oversaw the registration received clear instructions. He had to register "[...] the occupation of the woman when entering a marriage, or the job from which she resigned at the time of marriage or some time before in view of her prospective marriage" (van Poppel *et al.* 2009, p. 107). Both the groom and the bride reported their occupational titles themselves. Thus, despite the long timespan covered by the marriage records, the nature of and information provided by this source remained stable, which facilitates temporal comparability.

Marriage records have been used to research various aspects of family history such as changing family relations, the development of socially mixed marriages, social mobility, and demography (van Poppel and Nelissen 1999; Bras and Kok 2005; van Leeuwen and Maas 2007; van Bavel and Kok 2009; Bras 2011; van Leeuwen and Zijdeman 2014). Still, there are some impediments that need to be discussed. Most importantly, the records do not capture the occupations of women who would never marry. The proportion of single women was relatively large in the Netherlands, but the overall share remained fairly stable over time—particularly for women over 40 (table 4). Women's average age at first marriage (in our sample) decreased from approximately 28 during the first half of the nineteenth century to 26 during the early twentieth century (table B1 in Appendix B).

Young women are thus overrepresented in the database. The bias from excluding older women from our sample is likely to be limited, however. In the 1899 census, reported LFP for unmarried women aged 35–49 was comparable to that of younger women (aged 18–34), around 50 percent. For women in their 50s, the UFLFP was 41 percent and for women in their 60s it was 30 percent. This means that our sample of mostly young unmarried women might overstate overall UFLFP by a small fraction. Given the relatively constant share of older unmarried women who are likely excluded from our sample, we do not expect our results to be biased significantly over time.

Four other biases need to be taken into consideration. First, the records only inform us about unmarried women's LFP, as they do not state whether the bride continued her work during her married life. Second, the source is likely to provide a lower-bound estimate of the percentage share of working unmarried women, as brides could choose not to state an occupation if they knew beforehand they would quit after they had married. Third, our dataset only includes seven of the eleven Dutch provinces. Tables B2a and B2b provide summary statistics for all provinces for the year 1899. For that year, the seven provinces included in our sample cover about two-thirds of the population and the labor force. Given the broad coverage and diversity in terms of population size and sectoral employment composition of the provinces in our sample, we feel confident the results from our analysis are representative for the entire country. Finally, we do not have information on whether the marriage recorded is the bride's first, second, or third marriage, a factor which might affect the likelihood of a bride stating an occupation. Excluding brides over 30 from our sample, who are more likely to

have previously been divorced or widowed, does not affect the results to a meaningful degree (see Appendix C).

To quantify the relative importance of the effects of income, shifting sectoral employment shares, and social norms on UFLFP, we run a logistic regression to estimate the probability that a woman stated an occupation upon marriage. For all brides, we reclassified the occupational titles listed in the marriage records into a binary variable, i.e., "0" when the bride did not state an occupation and "1" if she did. The three primary drivers of UFLFP will be measured as follows.

First, to capture the effect of (rising) incomes on UFLFP over time, we incorporate the social status of the groom and national figures for gross domestic product (GDP) per capita in the regression.[7] We assume that higher social status corresponds with higher levels of household income.[8] We determine the groom's social status by recoding the occupational titles listed in the marriage records into seven distinct social classes for men (see table 5a) based on the Historical International Standard Classification of Occupations (HISCO) (van Leeuwen *et al.* 2002; van Leeuwen *et al.* 2004; van Leeuwen and Maas 2011). GDP per capita is taken from the Historical Statistics by Angus Maddison (Maddison 2010).[9] We expect that the growth in household income—either directly, through an elevation of the husband's occupational status, or indirectly through the growth of the average GDP per capita—encouraged women to give up their job, as the sole income of the husband was sufficient to support the entire family. Even though the (future) husband's occupation principally affected women's work activities during their married lives, it can still be used to predict the likelihood of a bride stating an occupation because the occupational status of fathers and husbands were highly correlated: endogamy rates—i.e., marrying within the same social class—were high and remained stable during the nineteenth century (Maas and van Leeuwen 2005). In short, a rise in household income is thus likely to have had a negative effect on UFLFP.

Second, we estimate the sectoral employment shares for the main economic sectors to determine the distribution of economic activity within a municipality at a given point in time. We apply this variable as a proxy for employment opportunities for unmarried women. We define this share as the percentage of persons employed in each of thirteen economic sectors (see table 5b), corresponding with the basic Standard Industrial Classification (SIC) (Ruggles *et al.* 2015). We estimate this share separately for each of the 254 municipalities in our sample: hence the total share always sums up to 100 percent for every municipality. To determine these shares, we include male and female employment over the age of 16, both married and unmarried.[10] We exclude all persons that were unemployed, retired, or whose occupation could not be determined. We estimate the sectoral employment shares separately

[7] Unfortunately, GDP data is not available at the municipal or even the provincial level for the nineteenth and early twentieth century.

[8] Household income could also depend on the income of the father of the bride. In Appendix C, we include the occupational status of the bride's father as a control variable. Its inclusion does not materially affect the results.

[9] Real GDP is converted to constant 1913 Dutch Guilders and extrapolated between 1812 and 1819 using Smits *et al.* (1999). The log of the annual GDP per capita series is used.

[10] Male labor tends to be less concentrated in specific industrial branches and employment rates were higher than for women. Including both male and female labor thus leads to a more representative sample of the size of industry in each municipality. In Appendix C, we include the results of a regression based on municipal sectoral employment shares estimated for female labor only. The results are similar to those reported below. By including the occupations listed by the parents of the bride and the groom, we also observe the sectoral employment shares for married men and women from the marriage records. A robustness check again shows the results to be by and large insensitive to this assumption.

Table 4. *Share of unmarried women by age group 1830-1930*

Age	1830	1869	1899	1930
15-19	98%	99%	99%	98%
20-24	81%	83%	79%	75%
25-29	49%	50%	44%	38%
30-34	29%	29%	27%	22%
35-39	20%	20%	20%	17%
40-44	16%	16%	17%	16%
45-49	14%	14%	14%	15%
50-54	13%	14%	14%	15%
55-59	11%	13%	13%	14%
60-64	11%	13%	12%	14%
65-69	11%	13%	12%	14%
70-74	11%	13%	12%	14%
75-79	12%	13%	12%	13%
Total	*39%*	*40%*	*40%*	*38%*

Notes: The age groups for 1830 were slightly different from the other years. Widows and divorced women are excluded from the table. Sources: Dutch censuses (1830; 1869; 1899; 1930).

for every decade, starting in 1812 and ending in 1929. This allows us to determine whether an expansion of say, the relative share of employment in agriculture had a greater effect on the likelihood of brides stating an occupation than a relative shift towards more service-oriented jobs.

The primary sources for the data on sectoral employment shares are the 1899 occupational census and the marriage records for all years in our sample. The main appeal of the 1899 census is its broad coverage and the direct data on employment by sector—meaning the census lists the total number of men and women engaged in each sector. The marriage records instead report occupations, which can be linked to the thirteen sectors. Not all occupations can be easily allocated to a specific sector, however, introducing a source of uncertainty from the marriage records. The 1899 census therefore serves as a solid benchmark estimate of sectoral employment shares for the largest municipalities in 1899, whereas the marriage records provide shares for the smaller municipalities and, crucially, data on the change of sectoral employment shares over time. Appendix B provides a complete discussion of the methods behind the construction of the sectoral employment shares and a comparison between the marriage records and the 1899 census. Here we show that both sources paint a reassuringly similar picture of the distribution of economic activity in Dutch municipalities.

Third, social norms are the most difficult to measure since they are essentially "social attitudes of approval and disapproval, specifying what ought to be done and what ought not to be done" (Sunstein 1996, p. 914). In the context of this research, social norms regarding marital behavior are the most important, which we attempt to capture using the bride's age at the time of marriage.[11] Age at marriage tells us something about the long-standing tradition of working between youth and marriage. The drop in age at marriage during the second half of the nineteenth century indicates that it became less common and less acceptable for women

[11] Alternatively, we could use the Girl Power Index (GPI) (Carmichael 2011).The bride's age and GPI are closely related and the results from implementing either measure correspond closely. We thus prefer the simpler measure of the bride's age.

Table 5a. *Summary statistics categorical variables*

	% of sample	*% brides with occ.*
Occupational status of groom		
Upper class	3.2	14.3
White-collar middle class	14.5	16.4
Skilled workers	18.2	28.0
Farmers	14.5	27.0
Lower-skilled (farm) workers	15.3	32.7
Unskilled workers	13.6	39.5
Unskilled farm workers	20.7	50.7
Period of marriage		
1812-1819	3.8	52.1
1820-1829	5.4	54.6
1830-1839	5.7	54.7
1840-1849	6.2	51.9
1850-1859	7.3	48.8
1860-1869	8.0	43.2
1870-1879	8.7	37.7
1880-1889	8.7	32.2
1890-1899	10.0	23.8
1900-1909	11.3	18.5
1910-1919	13.0	16.3
1920-1929	11.9	15.0
Province		
Drenthe	5.7	41.2
Gelderland	18.2	32.8
Groningen	11.6	34.9
Limburg	10.6	37.6
Overijssel	13.1	34.8
Zeeland	9.1	60.7
Noord-Holland	31.2	19.9
Rural or urban municipality		
Rural	40.1	38.1
Urban	59.9	29.2

Note: summary statistics for municipalities are listed in table A2 in Appendix A. Figures may not sum to total due to rounding. Source: see text.

to spend a prolonged period of time in the labor force before getting married. If these norms indeed had an impact, we would thus expect higher UFLFP rates in regions where age at marriage was high.

Given the complex nature of social norms, the bride's age variable is unlikely to capture the changes over time completely. The time dummies (decades) we include in the regression act as a residual and will capture those factors that have not been contained by the other variables in our model. Apart from evolving social norms, the time dummies will therefore also capture other (unmeasured) factors such as migration and fertility.

Table 5b. *Summary statistics continuous variables*

	Mean	*Mean 1812-9*	*Mean 1920-9*	*Stdev.*	*Min.*	*Max.*	*Correlation % brides with occ.*
Sectoral share (%)							
Agriculture and fishing	33.9	38.0	24.3	25.7	0.0	99.6	0.14
Coal mining	0.4	0.1	1.6	3.8	0.0	54.4	0.03
Peat extraction	1.3	0.5	1.7	4.7	0.0	43.7	-0.08
Construction	6.5	4.3	7.7	3.0	0.0	51.6	-0.27
Food, tobacco and beverages	4.3	3.6	4.7	2.7	0.0	25.3	-0.24
Textile and apparel mnf.	10.4	12.5	10.1	8.6	0.0	65.9	0.05
Metal and machinery mnf.	3.1	1.8	5.4	3.0	0.0	40.7	-0.23
Paper and chemical mnf.	1.2	0.6	1.8	1.7	0.0	28.9	-0.18
Glass, pottery, misc. mnf.	5.0	3.5	5.7	5.1	0.0	41.8	-0.11
Transportation and public utilities	6.0	4.7	8.4	4.9	0.0	100.0	-0.23
Wholesale and retail trade	8.6	7.1	12.2	8.0	0.0	50.0	-0.24
Finance, insurance and real estate	0.9	0.5	1.6	0.8	0.0	7.3	-0.19
Personal, professional and public services	18.4	22.8	14.9	10.0	0.0	100.0	0.03
GDP p. capita (log)	5.68	5.09	6.14	0.29	5.02	6.31	-0.31
Bride age	26.9	28.0	25.7	7.0	16	65	0.05

Notes: mean values for all observations in our sample, for all decades and the first and last decade respectively. Correlation presents the Spearman rank-order correlation coefficient. Source: see text.

Since social attitudes towards UFLFP are likely to have differed at the municipal level, we include a full set of dummies for each of the 254 municipalities in our sample. These dummies capture any fixed effects for municipalities not accounted for by the other independent variables. This will help us to obtain a purer measure of the nationwide change in social norms over time, as the municipal dummies explicitly capture the effect of shifts in the municipal shares in our sample—i.e., a decline in UFLFP resulting from a relative increase of the number of marriages in municipalities where social attitudes towards UFLFP are particularly rancorous.

We further include information on whether the bride and groom lived in an urban or a rural location. The literature suggests that there were substantial variations in UFLFP across provinces and that brides in urban areas were less likely to report an occupation (Van Poppel *et al.* 2009). We used the 1899 census to classify the municipalities as either urban (over 5,000 inhabitants) or rural (fewer than 5,000 inhabitants).

Figure 1 illustrates the spatial coverage of our dataset and shows the differences in the rate of UFLFP. Tables 5a and 5b provide an outline of the main variables in the model. Table 5a summarizes the categorical variables: the rightmost column shows the share of brides that reported an occupation for that specific variable/category, while the middle column reports the share that each of the listed categories represents out of the total sample.[12] Table 5b summarizes the continuous variables in the sample: the share of employment in each of the thirteen major economic sectors at the municipal level and GDP per capita. The final column in table 5b describes the relationship between these variables and UFLFP. Here we list the rank order correlations between the average sectoral employment shares and the average share of brides stating an occupation.[13]

In our regression, we predict the likelihood that bride i reports an occupation in the marriage records. This probability should be bounded by 0 and 1, continuous and nonlinear, conditions which are all met by a logit model:

$$\Pr\{y_i = 1 \,|x_i\} = \frac{e^{x_i'\beta}}{1 + e^{x_i'\beta}}. \tag{1}$$

The right-hand side of equation (1) is a distribution function with mean 0 and standard deviation 1. The coefficients (β) are estimated using maximum likelihood, which is the optimal parametric estimator in this context.

5. Regression results

A cursory look at tables 5a and 5b reveals several robust correlations between the covariates. First, there is a clear negative relation between UFLFP and the occupational status of the groom. Only 14 percent of the women with the future husband holding an upper-class position reported an occupation, versus 50 percent of the women marrying unskilled farm workers. Second, there were large differences in UFLFP between the provinces, which could be driven by the fact that, third, women in rural municipalities appeared more likely to report work than those in urban areas.

In table 5b, the bride's age variable shows that older brides were more likely to report an occupation. The Spearman correlation is, at 0.05, quite low, suggesting that this variable may capture only part of the shifts in social norms or that social norms were not driving UFLFP. National shifts in social norms could otherwise be captured by the period of marriage dummy. Table 5a shows that a little over 50 percent of the women reported an occupation prior to 1850 while less than 20 percent did so after 1900. Thus, there was a decline in either the actual UFLFP or the willingness of unmarried women to report their occupation.

The main variables of interest are the sectoral employment shares summarized in table 5b. The positive rank-order correlations in the last column of this table suggest that a greater than average share of employment in the "agriculture and fishing", "coal mining", "textile

[12] The summary statistics for the municipalities in our sample are listed in Appendix A.

[13] For the Spearman rank-order correlation, we sorted the municipalities from lowest to highest ranking for both the sectoral employment share and the share of brides stating an occupation. This allows us to compare whether municipalities that have a relative high share of employment in say "wholesale and retail trade" report a greater than average or lower than average share of brides stating an occupation.

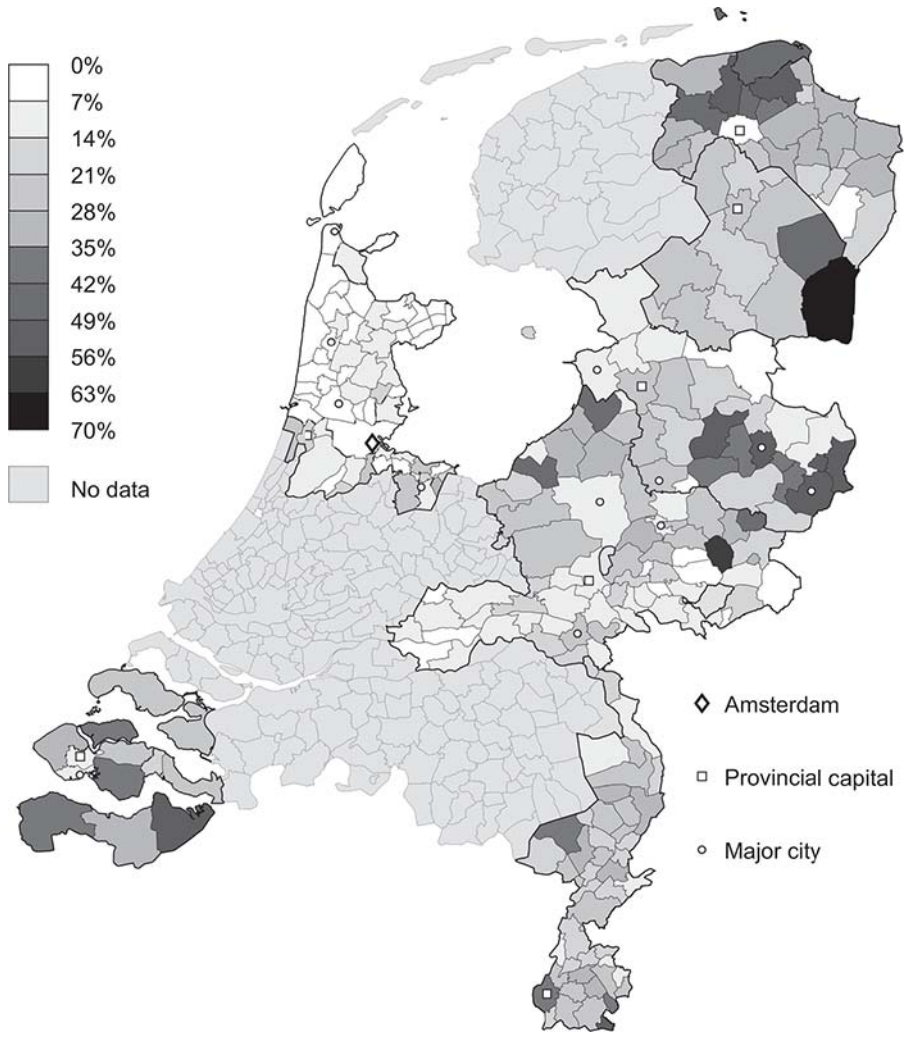

Figure 1. UFLFP: share of brides stating an occupation by municipality. Notes: map indicates the share of brides stating an occupation in the marriage records for the years between 1890 and 1929. No data indicates that less than 100 marriages were recorded in the respective municipality or the municipality is not included in our sample; i.e. all municipalities in Friesland, Utrecht, Zuid-Holland and Noord-Brabant. Source: marriage records 1890-1929.

and apparel manufacturing", and the "personal, professional, and public services" sectors generally coincided with a higher rate of UFLFP in any given municipality.

For most of the other sectors, we observe the reverse relationship. The varying impact of different sectors on UFLFP provides support for our hypothesis that shifts in local economic structures indeed affected women's labor market opportunities. Still, the real test is whether these differences remain when all variables are included into a single model and whether

changes in the structure of the Dutch economy can explain a significant portion of the decline in UFLFP at the municipal level throughout the long nineteenth century.

Table 6 reports the results from the logistic regression. The odds ratios are presented here, as these provide a readily interpretable estimate of the expected increase/decrease in the likelihood that a woman held a job at specified times, places, or given the occupation of her future husband. For each of the independent categorical variables, we first list the reference category between parentheses and then return the odds ratios for the alternative categories. All models include full sets of dummies for the municipalities, allowing for regional (fixed) variations in, for example, social norms (see table A1 in Appendix A). The effects we observe therefore do not explain variations in the UFLFP between municipalities, but rather changes in the UFLFP over time within each municipality.

Model (1) starts with a basic regression that only includes a set of dummies for the occupational status of the groom, decade, rural/urban, and municipality. Comparing the other models to this baseline estimate enables us to evaluate the explanatory power of the variables included when controlling for the structure of the local economy, income, and the bride's age.

The occupational status of the groom had a significant and negative impact on the likelihood of the bride stating an occupation. The odds for white-collar employees are almost four times lower than for the reference category (unskilled farm workers). The odds ratios for the decades prior to 1900 are on the ohter hand very large, significant, and tend to decrease over time. Clearly, the drop in UFLFP is not fully explained by the other variables included in model (1).

Model (2) incorporates all the remaining variables: annual GDP per capita, bride's age, and the sectoral employment shares. For GDP per capita, the odds ratio smaller than one indicates that an increase in the average national income tends to depress UFLFP. The significant odds ratio for the bride's age indicates that a relative increase in this variable has a positive effect on the likelihood of her reporting an occupation. Or vice versa, a decrease in the age of the bride, as we observed between 1812 and 1929, reduces the likelihood of her holding a job at the time of marriage. Still, its effect on UFLFP is modest: a full standard deviation increase would raise the odds for a bride reporting an occupation by a little over 30 percent.

Three important observations stand out when we introduce sectoral employment shares in model (2). First, quite a few sectors have a significant and substantive impact on UFLFP. Second, the odds ratios are not always in line with the correlations in table 5b. Whereas the correlation in table 5b suggests a negative relation between "peat extraction" and UFLFP; for example, the odds ratios in table 6 suggest an increase of this sector's share (relative to the share of employment in the reference category: agriculture) to have a positive impact on UFLFP. Third, the introduction of the sectoral employment shares greatly reduces the odds ratios for the decade dummies.

The odds ratios for "coal mining"; "peat extraction"; "textile and apparel manufacturing"; "glass, pottery, and miscellaneous"; and the "personal, professional, and public services" are positive and significant. The ratios show that the impact of shifts in the economic structure within municipalities was substantial. An increase of just 1 percent in the share of employment for any of these sectors explains about a 3–7 percent increase in the odds. For a given municipality, a one-standard-deviation increase in the share of employment in "personal, professional, and public services" would increase the odds of brides stating an occupation by 85 percent. The "construction", "wholesale and retail trade", and the "finance, insurance, and real estate" sectors show odds significantly below 1. An increasing employment share in these sectors would mean a reduction in the UFLFP.

Table 6. *Odds ratios for brides stating an occupation ('no occupation' = 0)*

	(1)	(2)	(3)
Occupational status of groom (unskilled farm workers = 1.000)			
Upper class	0.170***	0.196***	0.164***
White-collar middle class	0.273***	0.297***	0.268***
Skilled workers	0.501***	0.535***	0.490***
Farmers	0.347***	0.410***	0.354***
Lower-skilled workers and farm workers	0.655***	0.715***	0.641***
Unskilled workers	0.850***	0.867***	0.802***
Period of marriage (1920-1929 = 1.000)			
1812-1819	7.780***	1.742**	1.651**
1820-1829	8.695***	2.157***	2.064***
1830-1839	8.768***	2.434***	2.270***
1840-1849	7.784***	2.300***	2.190***
1850-1859	6.776***	2.027***	2.036***
1860-1869	5.272***	1.661***	1.735***
1870-1879	4.177***	1.533**	1.587***
1880-1889	3.218***	1.411***	1.468***
1890-1899	1.961***	0.983	1.049
1900-1909	1.389*	0.889	0.941
1910-1919	1.213	0.901	0.922
Rural or urban municipality (Urban = 1.000)	1.043	0.946	1.038
Gross Domestic Product p. capita		0.580**	0.556***
Bride age		1.023***	
Sectoral employment shares in municipality (Agriculture and fishing = 1.000)			
Coal mining		1.031***	1.028***
Peat extraction		1.039***	1.031**
Construction		0.961**	0.964***
Food, tobacco and beverages mnf.		0.975	0.964**
Textile and apparel mnf.		1.041***	1.040***
Metal and machinery mnf.		1.026*	1.023
Paper and chemical mnf.		1.009	1.011
Glass, pottery, misc. mnf.		1.066***	1.054***
Transportation and public utilities		1.001	1.008
Wholesale and retail trade		0.951***	0.945***
Finance, insurance and real estate		0.876*	0.902
Personal, professional and public services		1.064***	1.063***
Observations	1,849,608	1,529,470	1,849,608
Pseudo R^2	0.200	0.223	0.212

Notes: *** p<0.01, ** p<0.05, * p<0.1; Standard errors reported separately in Appendix A; Pseudo R2 is McFadden's adjusted R2; All models include a full set of dummies for municipalities. Source: marriage records 1812-1929.

The introduction of our primary variables in model (2) substantially lowers the odds ratios for the decade dummies. Whereas in model (1) there is a large gap between the odds reported for the earlier and later decades, in model (2) the odds during the first four decades are only twice as high during the 1920s. Although there is still a significant decline in UFLFP that cannot be explained by any of the other variables in the regression, it is markedly less than suggested by Van Poppel *et al.* (2009), demonstrating the importance of economic structure in particular.

Model (3) provides a sensitivity check to the results from model (2). This regression excludes the bride's age variable, but includes all 320,000 observations from the province of Groningen (for which there is no data on the age of the bride). The results from the third model mirror the odds listed for model (2); none of the coefficients that were significant in the second model change sign and generally only shift modestly.

Table C1 in appendix C provides four additional robustness checks. First, we exclude all 334,000 observations from Amsterdam, which, given its large size and diverging labor market, may skew the results of the logistic regression. Second, we replace the sectoral employment shares for each municipality in our sample, which are currently based on the sectoral employment shares for both men and women, by shares based solely on female labor. This prevents skewing the local labor market shares by jobs exclusively performed by men. However, using the female labor force for this purpose could introduce a fair amount of circularity in the model, where the extent of UFLFP in a municipality is explained by itself. Third, we include the occupational status of the bride's father as a control variable proxying the bride's family income. Fourth, we exclude all brides over the age of 30, who were more likely to have previously been divorced or widowed and may have been more likely to work. In all cases, the results are robust. In particular, the odds ratios for the sectoral employment shares remain largely unaffected.

6. A decomposition of changing UFLFP

The results from the regression show that the structure of the (local) economy, increases in household income, and, likely, change in social norms significantly affected UFLFP. This does not answer the question of what was ultimately driving the sizable and prolonged decline of Dutch UFLFP. We address this issue by applying a basic shift-share framework to decompose growth of UFLFP over time. Appendix D provides further details on the methodology and a numerical example.

Table 7 below presents the results of the decomposition. The left column lists the change in UFLFP between 1812 and 1929 that can be contributed to the variables in model (2). For ease of interpretation, the rightmost column shows the percentage share of the decline in UFLFP attributable to each respective independent variable.

The decomposition reveals that shifting sectoral employment shares in the Netherlands explain 49 percent of the decline in UFLFP over the entire period. The occupational status of the groom (7 percent) and GDP per capita (25 percent) account for another 32 percent of the change in UFLFP. The bride's age only has a limited impact on the decline in UFLFP accounting for one percent of the change. Shifts in the share of brides living in cities, captured by the rural/urban variable, had a negligible effect on the aggregate participation rates. Changes in the distribution of marriages across municipalities explain 4 percent of the decline in UFLFP. This contribution could represent migration flows towards municipalities that offer less job opportunities for women or that exhibit stricter social norms. Alternatively, these municipalities could also exhibit higher fertility rates, causing the population of municipalities with lower rates of UFLFP to expand faster over time. Unfortunately, we lack specific data on these demographic variables, precluding a more direct analysis of these factors on UFLFP. In either case, the contribution of the municipal variable to the change in UFLFP was comparatively small. The residual or unexplained variation in UFLFP over time encompasses a little under 15 percent of the decline in participation rates. This residual could capture any relevant factor that is driving the shifts in demand for as well as the supply of female labor that is not specifically included in the regression model.

Table 7. *Contribution to the change in UFLFP, 1812–1929*

Variable	*Contribution to growth (log %)*	*Percentage share*
Sectoral employment shares	-62	49
Occupational status of groom	-9	7
GDP p. capita	-32	25
Bride age	-2	1
Rural/urban	1	0
Municipality	-5	4
Residual	*-17*	*14*
Total	-125	100

Note: figures may not sum to total due to rounding. Source: see text.

The results in table 7 suggest that the changing structure of the Dutch economy is the most important driving force behind the decline of UFLFP between 1812 and 1929. Over the entire period, but particularly from 1860 onwards, the sectors that affected UFLFP negatively expanded their share in the Dutch economy, particularly trade services. At the same time, the sectors that did provide opportunities for female labor were unable to retain their relative share—both the "textile and apparel manufacturing" and the "personal, professional, and public services" declined in relation to the other sectors of the economy (see table B1 in Appendix B).

7. Conclusion

This article has argued that to understand the relatively low levels of Dutch FLFP during the nineteenth and early twentieth centuries, we need to study unmarried and married women separately. Furthermore, we contended that besides changing social norms and rising levels of income—which are usually put forward as the most important drivers of FLFP—shifting sectoral employment shares were crucial in determining the course of women's labor history. We studied unmarried women's LFP and included all three drivers of UFLFP into one analytical framework.

Based on nearly 2 million marriage records, we ran a logistic regression, accounting for the occupational status of the groom, the decade and municipality where the marriage took place, the age of the bride, GDP per capita, and the characteristics of the local labor market. The results show that local economic structures influenced UFLFP to a significant degree. Especially "textile and apparel manufacturing" and "personal, professional, and public services" had a positive effect on UFLFP. Throughout the long nineteenth century, an increase in the sectoral employment share for these sectors in a given municipality generally coincided with an increase in the UFLFP.

We decomposed UFLFP based on the variables used in the regression. Our results indicate a clear link between the local structure of the economy, household income, and UFLFP. While this result cannot be interpreted as causal, it is worth noting that the statistical relationship between these variables is large enough to account for a substantial fraction of the aggregate trend decline of women in the labor force. Sectoral shifts in the Dutch economy in the period 1812–1929 accounted for half of the decline in UFLFP. The occupational status of the groom and GDP per capita, the variable that captures the general rise in household income in the Netherlands during this period, accounted for another third of the change in UFLFP. The

residual category or unexplained variation in UFLFP over time encompasses a little under 15 percent of the decline in participation rates. This residual could capture any relevant factor that is not specifically included in the regression model, such as the increasingly pressing domesticity norm. Our qualitative analysis of the 1890 labor surveys illustrated that the local labor market opportunities also affected married women's LFP, but that the domesticity norm played an important part in their labor allocation as well. Future research will have to delve further into the causal channels that underlie the relationship between the various drivers of FLFP.

Our primary conclusion is that shifting sectoral employment shares explain a considerable part of the developments of UFLFP within the Netherlands and may also explain part of the low LFP rates for all Dutch women relative to other countries. We have shown that the expansion of the professional service sector and the relatively small textiles, large agricultural and well-developed transport, and wholesale and retail sectors is an important source behind the decreasing UFLFP during the long nineteenth century. This suggests that the specific path of Dutch economic development, especially compared to England and Belgium, could have been driving the diverging FLFP rates within Western Europe during the long nineteenth century. This is an important avenue for future research that can be tested by incorporating civil records and occupational censuses of other European countries into the model introduced in this paper.

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References

Allen, R.C., Bassino, J.-P., Ma, D., Moll-Murata, C. and van Zanden, J.L. (2011). Wages, prices and living standards in China, 1738–1925: in comparison with Europe, Japan, and India. *Economic History Review* **64**, pp. 8–38.

Arbeidsinspectie (1890a). *Enquête, gehouden door de staatscommissie benoemd krachtens de wet van 10 januari 1890 (staatsblad no. 1) (tweede afdeeling). Twente*. The Hague: Van Weelden & Mingelen.

Arbeidsinspectie (1890b). *Enquête, gehouden door de staatscommissie benoemd krachtens de wet van 10 januari 1890 (staatsblad no. 1) (tweede afdeeling). Veenderijen*. The Hague: Van Weelden & Mingelen.

Atkinson, P. (2012). Isn't it time you were finishing? Women's labor force participation and childbearing in England, 1860–1920. *Feminist Economics* **18**, pp. 145–164.

van Bavel, J. and Kok, J. (2009). Social control and the intergenerational transmission of age at marriage in rural Holland, 1850–1940. *Population* **64**, pp. 343–360.

Boter, C. (2017). Ideal versus reality? The domesticity ideal and household labour relations in Dutch industrializing regions, circa 1890. *The History of the Family* **22**, pp. 82–102.

Bras, H. (2011). Intensification of family relations?: Changes in the choice of marriage witnesses in the Netherlands, 1830–1950. *Tijdschrift voor Sociale en Economische Geschiedenis* **8**, pp. 102–135.

Bras, H. and Kok, J. (2005). "They live in indifference together": marriage mobility in Zeeland, the Netherlands, 1796–1922. *International Review of Social History* **50**, pp. 247–274.

Burnette, J. (2008). *Gender, Work and Wages in Industrial Revolution Britain*. Cambridge: Cambridge University Press.

Carmichael, S. (2011). Marriage and power: age at first marriage and spousal age gap in lesser developed countries. *The History of the Family* **16**, pp. 416–436.
Feinstein, C.H. (1976). *Statistical Tables of National Income, Expenditure, and Output of the U.K., 1855–1965*. Cambridge: Cambridge University Press.
Gerding, M.A.W. (1995). *Vier eeuwen turfwinning: de verveningen in Groningen, friesland, drenthe en overijssel tussen 1550 en 1950*. Wageningen: Afdeling Agrarische Geschiedenis.
Griffiths, R. (1979). *Industrial Retardation in the Netherlands 1830–1850*. The Hague: Nijhoff.
de Groot, G. (2001). *Fabricage van verschillen: Mannenwerk, vrouwenwerk in de Nederlandse industrie (1850–1940)*. Amsterdam: Aksant.
de Groot, G. (2002). Aanlappers en drossters: mannenwerk, vrouwenwerk in de Nederlandse katoenspinnerij (1865–1948) te Hengelo (ov.). *Textielhistorische Bijdragen* **42**, pp. 19–42.
Horlings, E. and Smits, J.-P. (1997). A comparison of the pattern of growth and structural change in the Netherlands and Belgium, 1800–1913. *Economic History Yearbook* **38**, pp. 83–91.
Humphries, J. and Sarasua, C. (2012). Off the record: reconstructing women's labor force participation in the European past. *Feminist Economics* **18**, pp. 39–67.
Jansen, M. (1999). *De industriële ontwikkeling in Nederland 1800–1850*. Amsterdam: NEHA.
Janssens, A. (2014). *Labouring Lives: Women, Work and the Demographic Transition in the Netherlands, 1880–1960*. Bern: Peter Lang.
De Jonge, J. (1976). De industrialisatie in Nederland tussen 1850 en 1914. *Nijmegen: Socialistische Uitgeverij Nijmegen* .
van Leeuwen, M. and Maas, I. (2007). Economische specialisering en veranderende sociale verhoudingen in de 19e en 20e eeuw: een studie op basis van de Nederlandse volkstellingen en huwelijksakten. In O. Boonstra, P.K. Doorn, M.P.M. van Horik, J.G.S.J. van Maarseveen and J. Oudhof (eds), *Twee eeuwen Nederland geteld. Onderzoek met de digitale volks-, beroeps- en woningtellingen 1795–2011*. The Hague: DANS, pp. 181–205.
van Leeuwen, M. and Maas, I. (2011). *HISCLASS: A Historical International Social Class Scheme*. Leuven: Leuven University Press.
van Leeuwen, M., Maas, I. and Miles, A. (2002). *HISCO: Historical International Standard Classification of Occupations*. Leuven: Leuven University Press.
van Leeuwen, M., Maas, I. and Miles, A. (2004). Creating a historical international standard classification of occupations. An exercise in multinational interdisciplinary cooperation. *Historical Methods: A Journal of Quantitative and Interdisciplinary History* **37**, pp. 186–197.
van Leeuwen, M. and Zijdeman, R. (2014). Digital humanities and the history of working women: a cascade. *The History of the Family* **19**, pp. 411–425.
Maas, I. and van Leeuwen, M.H.D. (2005). Total and relative endogamy by social origin: a first international comparison of changes in marriage choices during the nineteenth century. *International Review of Social History* **50**, pp. 275–295.
Maddison, A. (2010). Statistics on world population, GDP and per capita GDP, 1–2008 AD. In *Historical Statistics of the World Economy: 1–2008 AD*.
Mandemakers, K. Dataset WieWasWie Marriage Certificates Occupations (original values), release 2014_01. (unpublished).
Mitchell, B.R. (1988). *British Historical Statistics*. Cambridge: Cambridge University Press.
Mokyr, J. (2000). The industrial revolution and the Netherlands: why did it not happen? *De Economist* **148**, pp. 503–520.
Mourits, R. (2019). *Exceptional Lives, Extraordinary Families: Familial Clustering of Longevity in the 19th and Early-20th Century*. Nijmegen: Radboud University.
van Nederveen Meerkerk, E. and Paping, R. (2014). Beyond the census. Reconstructing Dutch women's labour market participation in agriculture in the Netherlands, ca. 1830–1910. *The History of the Family* **19**, pp. 447–468.
Plantenga, J. (1993). *Een afwijkend patroon: Honderd jaar vrouwenarbeid in Nederland en (west-) Duitsland*. Amsterdam: SUA.

van Poppel, F. (1992). *Trouwen in Nederland: een historisch-demografische studie van de 19e en vroeg-20e eeuw*. Wageningen: Afdeling Agrarische Geschiedenis.

van Poppel, F., van Dalen, H.P. and Walhout, E. (2009). Diffusion of a social norm: tracing the emergence of the housewife in the Netherlands, 1812–1922. *The Economic History Review* **62**, pp. 99–127.

van Poppel, F. and Nelissen, J. (1999). The proper age to marry: social norms and behavior in nineteenth-century Netherlands. *The History of the Family* **4**, pp. 51–75.

Pott-Buter, H. (1993). *Facts and Fairy Tales about Female Labor, Family, and Fertility: A Seven-country Comparison, 1850–1990*. Amsterdam: Amsterdam University Press.

van Riel, A. (2018). *Trials of Convergence: Prices, Markets and Industrialization in the Netherlands, 1800–1913*. Utrecht: Utrecht University.

Ruggles, G., Genadek, K., Goeken, R., Grover, J. and Sobek, M. (2015). Integrated Public Use Microdata Series: Version 6.0. Minneapolis: University of Minnesota.

Smit, C. (2006). Arbeidersvrouwen tussen fabriek en huisgezin: Deel II: werk, opvoeding en huishouden. *Jaarboek der Sociale en Economische Geschiedenis van Leiden en Omstreken* **18**, pp. 73–116.

Smits, J.P. (1999). Economische ontwikkeling, 1800–1995. In R.J. van der Bie and P. Dehing (eds), *Nationaal goed. Feiten en cijfers over onze samenleving (ca.) 1800–1999*. Voorburg: Centraal Bureau voor de Statistiek, pp. 15–33.

Smits, J.P., Horlings, E. and van Zanden, J.L. (1999). *Dutch GNP and Its Components, 1800–1913*. Groningen: Groningen Growth and Development Centre.

van Sonsbeek, J.L.A. (2005). *Van de schaduw des doods tot een licht ten leven: de historie van de methodiek van de doodsoorzakenstatistiek in Nederland, 1865–2005*. Voorburg: Centraal Bureau voor de Statistiek.

Sunstein, C.R. (1996). Social norms and social roles. *Columbia Law Review* **96**, pp. 903–968.

Vermaas, A. (1995). Real industrial wages in the Netherlands, 1850–1913. In P. Scholliers and V. Zamagni (eds), *Labour's Reward: Real Wages and Economic Change in 19th- and 20th-century Europe*. Aldershot: E. Elgar, pp. 138–150.

de Vries, J. (2008). *The Industrious Revolution: Consumer Behavior and the Household Economy, 1650 to the Present*. Cambridge: Cambridge University Press.

You, X. (2019). Women's labour force participation in nineteenth century England and Wales: evidence from the 1881 census enumerators' books. *The Economic History Review* 1–28. doi.org/10.1111/ehr.12876.

van Zanden, J.L. (1985). *De economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800–1914*. Wageningen: Afdeling Agrarische Geschiedenis, Landbouwhogeschool.

van Zanden, J.L. and van Riel, A. (2004). *The Strictures of Inheritance: The Dutch Economy in the Nineteenth Century*. Princeton: Princeton University Press.

Appendix A. Full regression results

Table A1. *Odds ratios for brides stating an occupation ("no occupation" = 0)*

	(1)		(2)		(3)	
Occupational status of groom (unskilled farm workers = 1.00)						
Upper class	0.170	(0.0122)	0.196	(0.0166)	0.164	(0.0118)
White-collar middle class	0.273	(0.0106)	0.297	(0.0140)	0.268	(0.0103)
Skilled workers	0.501	(0.0117)	0.535	(0.0137)	0.490	(0.0102)
Farmers	0.347	(0.00909)	0.410	(0.0112)	0.354	(0.00880)
Lower-skilled workers and farm workers	0.655	(0.0150)	0.715	(0.0186)	0.641	(0.0142)
Unskilled workers	0.850	(0.0261)	0.867	(0.0307)	0.802	(0.0244)
Period of marriage (1920–1929 = 1.00)						
1812–1819	7.780	(0.869)	1.742	(0.480)	1.651	(0.392)
1820–1829	8.695	(0.972)	2.157	(0.526)	2.064	(0.430)
1830–1839	8.768	(0.983)	2.434	(0.542)	2.270	(0.434)
1840–1849	7.784	(0.970)	2.300	(0.501)	2.190	(0.406)
1850–1859	6.776	(0.856)	2.027	(0.407)	2.036	(0.346)
1860–1869	5.272	(0.709)	1.661	(0.305)	1.735	(0.269)
1870–1879	4.177	(0.582)	1.533	(0.257)	1.587	(0.222)
1880–1889	3.218	(0.493)	1.411	(0.174)	1.468	(0.156)
1890–1899	1.961	(0.265)	0.983	(0.163)	1.049	(0.153)
1900–1909	1.389	(0.257)	0.889	(0.165)	0.941	(0.153)
1910–1919	1.213	(0.208)	0.901	(0.140)	0.922	(0.129)
Rural or urban municipality (urban = 1.00)	1.043	(0.0642)	0.946	(0.0699)	1.038	(0.0656)
GDP p. capita			0.580	(0.133)	0.556	(0.108)
Bride age			1.023	(0.00127)		
Sectoral employment shares in municipality (agriculture and fishing = 1.000)						
Coal mining			1.031	(0.00718)	1.028	(0.00671)
Peat extraction			1.039	(0.0129)	1.031	(0.0125)
Construction			0.961	(0.0154)	0.964	(0.0137)
Food, tobacco, and beverages mnf.			0.975	(0.0205)	0.964	(0.0164)
Textile and apparel mnf.			1.041	(0.00768)	1.040	(0.00756)
Metal and machinery mnf.			1.026	(0.0158)	1.023	(0.0153)
Paper and chemical mnf.			1.009	(0.0255)	1.011	(0.0224)
Glass, pottery, misc. mnf.			1.066	(0.0172)	1.054	(0.0155)
Transportation and public utilities			1.001	(0.0160)	1.008	(0.0116)
Wholesale and retail trade			0.951	(0.0151)	0.945	(0.0134)
Finance, insurance, and real estate			0.876	(0.0654)	0.902	(0.0565)
Personal, professional, and public services			1.064	(0.00706)	1.063	(0.00564)
Constant	0.777	(0.331)	2.591	(3.908)	7.050	(9.205)
Municipality dummies		Yes		Yes		Yes
Observations	1,849,608		1,529,470		1,849,608	

Notes: robust standard errors between parentheses; all models include a full set of dummies for municipalities.

Table A2. *Summary statistics for municipalities*

Municipality	% of sample	% of brides with occ.	Municipality	% of sample	% of brides with occ.
Aa en Hunze	0.5	31.6	Maasbree	0.2	37.7
Aalsmeer	0.2	6.3	Maasdriel	0.4	38.1
Aalten	0.3	32.1	Maastricht	1.7	45.8
Alkmaar	0.7	21.7	Margraten	0.2	38.7
Almelo	0.6	48.4	Marum	0.2	38.5
Ambt Montfort	0.1	30.2	Medemblik	0.1	19.9
Amstelveen	0.4	20.3	Meerlo-Wanssum	0.1	47.4
Amsterdam	18.5	21.2	Meerssen	0.3	34.1
Andijk	0.1	23.2	Meijel	0.1	30.0
Angerlo	0.1	32.1	Menterwolde	0.4	39.7
Anna Paulowna	0.1	26.5	Meppel	0.5	33.8
Apeldoorn	0.5	35.9	Middelburg	1.0	54.4
Appingedam	0.2	31.2	Midden-Drenthe	0.6	34.9
Arcen en Velden	0.1	45.8	Millingen aan de Rijn	0.1	35.2
Arnhem	1.6	31.2	Mook en Middelaar	0.1	26.7
Assen	0.4	32.4	Muiden	0.1	22.6
Barneveld	0.3	30.5	Naarden	0.1	36.6
Bathmen	0.1	30.8	Nederweert	0.2	63.4
Bedum	0.2	46.8	Neede	0.1	47.5
Beek	0.1	25.4	Neerijnen	0.2	18.7
Beemster	0.3	22.6	Niedorp	0.3	21.8
Beesel	0.1	36.0	Nijkerk	0.4	47.1
Bellingwedde	0.3	43.1	Nijmegen	1.3	36.5
Bennebroek	0.0	50.0	Noord-Beveland	0.3	69.8
Bergen	0.3	32.8	Noordenveld	0.3	35.3
Bergen	0.3	13.5	Noorder-Koggenland	0.2	30.1
Bergh	0.3	35.8	Nunspeet	0.0	69.6
Beuningen	0.1	39.5	Nuth	0.2	33.1
Beverwijk	0.3	14.5	Obdam	0.1	27.2
Blaricum	0.0	17.0	Oldebroek	0.2	69.1
Bloemendaal	0.2	32.4	Oldenzaal	0.2	49.4
Borculo	0.2	50.7	Olst-Wijhe	0.4	44.5
Borger-Odoorn	0.5	51.2	Ommen	0.2	44.3
Borne	0.2	50.7	Onderbanken	0.1	24.0
Borsele	0.4	73.2	Oostzaan	0.1	13.8
Brummen	0.3	43.4	Opmeer	0.2	15.4
Brunssum	0.1	16.4	Ouder-Amstel	0.1	29.4
Buren	0.5	23.7	Overbetuwe	0.5	28.1
Bussum	0.1	21.1	Pekela	0.5	20.9
Castricum	0.2	15.0	Purmerend	0.2	21.9
Coevorden	0.6	37.9	Putten	0.2	29.0
Culemborg	0.3	9.8	Raalte	0.4	37.4
Dalfsen	0.4	50.4	Reiderland	0.4	50.4
De Marne	0.5	48.5	Reimerswaal	0.4	54.1
De Wolden	0.6	47.5	Renkum	0.3	20.0

Continued

Table A2. *Continued*

Municipality	% of sample	% of brides with occ.	Municipality	% of sample	% of brides with occ.
Delfzijl	0.6	41.4	Rheden	0.5	33.3
Den Helder	0.8	2.1	Rijnwaarden	0.2	31.8
Deventer	1.2	27.1	Rijssen	0.4	35.2
Didam	0.2	46.4	Roerdalen	0.1	27.6
Diemen	0.1	27.8	Roermond	0.6	41.5
Dinkelland	0.5	37.5	Roggel en Neer	0.1	43.4
Dinxperlo	0.1	30.7	Ruurlo	0.1	65.7
Doesburg	0.1	22.5	Schagen	0.1	12.4
Doetinchem	0.2	26.2	Scheemda	0.5	51.7
Drechterland	0.1	11.2	Schermer	0.1	25.1
Druten	0.2	27.3	Scherpenzeel	0.1	31.5
Duiven	0.1	40.9	Schinnen	0.1	27.7
Echt-Susteren	0.4	31.9	Schouwen-Duiveland	1.1	64.5
Edam-Volendam	0.3	9.1	Sevenum	0.1	41.0
Ede	0.5	31.1	Simpelveld	0.1	45.9
Eemsmond	0.6	51.6	Sittard-Geleen	0.6	31.3
Eibergen	0.2	40.8	Slochteren	0.4	41.1
Eijsden	0.1	41.5	Sluis	1.1	67.9
Elburg	0.2	55.3	Stadskanaal	0.3	13.4
Emmen	0.7	65.1	Staphorst	0.2	42.0
Enkhuizen	0.3	18.9	Stede Broec	0.2	13.8
Enschede	0.8	62.7	Steenderen	0.1	38.2
Epe	0.3	52.0	Steenwijkerland	0.9	24.6
Ermelo	0.2	51.3	Stein	0.2	27.8
Geldermalsen	0.3	18.3	Swalmen	0.1	37.1
Gendringen	0.5	25.9	Ten Boer	0.2	52.1
Gennep	0.2	36.8	Terneuzen	0.9	63.8
Goes	0.5	56.7	Texel	0.3	2.0
Gorssel	0.2	45.2	Tholen	0.8	65.3
Graft-De Rijp	0.2	19.4	Thorn	0.1	39.2
Groenlo	0.1	35.0	Tiel	0.4	24.3
Groesbeek	0.2	25.5	Tubbergen	0.2	19.3
Groningen	2.7	18.0	Twenterand	0.4	27.2
Grootegast	0.3	39.2	Tynaarlo	0.3	33.3
Gulpen-Wittem	0.5	40.7	Ubbergen	0.1	35.4
Haaksbergen	0.2	22.7	Uitgeest	0.1	11.7
Haarlem	0.1	22.3	Uithoorn	0.1	25.1
Haarlemmerliede c.a.	0.1	19.3	Urk	0.0	27.8
Haarlemmermeer	0.3	5.5	Vaals	0.2	56.8
Haelen	0.1	39.0	Valkenburg aan de Geul	0.2	37.5
Hardenberg	0.4	18.8	Veendam	0.8	18.9
Harderwijk	0.3	22.4	Veere	0.6	61.3
Haren	0.2	35.0	Velsen	0.3	13.1
Harenkarspel	0.2	25.5	Venhuizen	0.2	15.3
Hattem	0.1	32.2	Venlo	0.6	35.3
Heel	0.1	36.2	Venray	0.2	44.7

Continued

Table A2. *Continued*

Municipality	% of sample	% of brides with occ.	Municipality	% of sample	% of brides with occ.
Heemskerk	0.1	22.4	Vlagtwedde	0.2	26.8
Heerde	0.2	43.6	Vlissingen	0.7	31.3
Heerhugowaard	0.1	14.4	Voerendaal	0.1	38.9
Heerlen	0.4	31.8	Voorst	0.3	48.3
Heiloo	0.1	15.3	Vorden	0.1	35.4
Helden	0.2	34.3	Wageningen	0.3	28.7
Hellendoorn	0.3	53.4	Warnsveld	0.1	42.5
Hengelo	0.6	44.1	Waterland	0.3	10.1
Heumen	0.1	35.1	Weert	0.4	40.8
Heythuysen	0.1	51.2	Weesp	0.3	18.2
Hilversum	0.5	28.5	Wehl	0.1	28.2
Hof van Twente	0.4	29.0	Wervershoof	0.1	9.5
Hoogeveen	0.6	35.4	West Maas en Waal	0.3	30.3
Hoogezand-Sappemeer	0.6	40.5	Wester-Koggenland	0.2	12.8
Hoorn	0.6	17.4	Westerveld	0.4	38.1
Horst aan de Maas	0.2	46.4	Westervoort	0.1	25.7
Huizen	0.2	20.1	Wierden	0.3	30.2
Hulst	0.9	74.8	Wieringen	0.1	5.2
Hummelo en Keppel	0.2	28.4	Wijchen	0.2	38.6
Hunsel	0.1	47.2	Wijdemeren	0.1	32.1
Kampen	1.0	28.8	Winschoten	0.3	32.4
Kapelle	0.2	53.4	Winsum	0.4	57.2
Kerkrade	0.6	26.8	Winterswijk	0.4	21.3
Kessel	0.1	51.0	Wisch	0.0	50.5
Kesteren	0.3	29.7	Wognum	0.1	24.9
Landgraaf	0.2	24.2	Wormerland	0.2	32.8
Landsmeer	0.2	12.0	Zaanstad	1.7	20.2
Langedijk	0.3	19.6	Zaltbommel	0.4	21.2
Laren	0.3	45.4	Zeevang	0.1	13.9
Leek	0.2	41.6	Zelhem	0.2	18.4
Lichtenvoorde	0.1	52.5	Zevenaar	0.1	40.0
Lingewaal	0.1	24.7	Zijpe	0.3	24.1
Lingewaard	0.4	31.2	Zuidhorn	0.5	56.6
Lochem	0.1	32.7	Zutphen	0.6	33.6
Loppersum	0.5	55.0	Zwartewaterland	0.4	26.3
Losser	0.3	52.4	Zwolle	1.4	33.9
Maasbracht	0.2	30.3			

Appendix B. Construction of the sectoral employment shares

The share of employment by sector constitutes a crucial variable in our analysis. We use this variable to determine the distribution of economic activity within a municipality at a given point in time. In other words, is for instance agriculture the largest sector or is textile and apparel manufacturing a major employer? We apply this variable as a proxy for employment opportunities for unmarried women, as discussed in the text.

A Sources

The construction of the sectoral employment shares for the 13 economic sectors in each of the 254 municipalities proceeds in three distinct steps. First, we determine the share of male and female employment in 1899 for larger municipalities on the basis of the occupational census for that year. Second, we estimate the sectoral employment shares for the remaining, smaller municipalities on the basis of the occupational returns for men and women in the marriage records for the last decade of the nineteenth century. Third, for each municipality, we estimate the change in the sectoral employment shares for every decade before and after 1890–1899, again based on the returns from the marriage records.

We define this share as the percentage of persons employed in each of the thirteen economic sectors we distinguish. We estimate this share separately for each of the 254 municipalities in our sample, hence the total share always sums to 100 percent for every municipality. To determine these shares, we include male and female employment over the age of 16, both married and unmarried.[14] We exclude all persons that were unemployed, retired, or whose occupation could not be determined. We estimate the sectoral employment shares for every decade, starting in 1812 and ending in 1929. Our dataset of sectoral employment shares thus includes 39,624 observations: 254 municipalities × 13 sectors × 12 decades. A summary of the average sectoral employment shares for our entire sample for each decade is provided in table B1 below.

The primary sources for the data on sectoral employment shares are the 1899 occupational census and the marriage records for years 1812–1929. The main appeal of the 1899 census is its broad coverage and the direct data on employment by sector. For the marriage records, we link employment to occupations, which in turn can be linked to the thirteen sectors. Not all occupations can be easily allocated to a specific sector, however, introducing a source of uncertainty from this source from which the 1899 census does not suffer. The 1899 census therefore serves as a solid benchmark estimate of sectoral employment shares for the largest municipalities in 1899, whereas the marriage records provide shares for the smaller municipalities and, crucially, data on the change of sectoral employment shares over time. A direct comparison of the sectoral employment shares derived from the marriage records and those recorded in the 1899 census, presented below in this appendix, reveals that both sources paint a reassuringly similar picture of the distribution of economic activity in Dutch municipalities.

The 1899 occupational census reports the number of men and women working in thirty-three separate industries for municipalities exceeding 5,000 inhabitants. This census provides the basis for our estimation of the sectoral employment shares for the years 1890–1899 for 103 of the largest municipalities. First, we combine employment for all thirty-three industries into the thirteen distinct sectors, corresponding to the major sectors of the SIC.[15] Second, we calculate the relative shares of employment for these thirteen major sectors.

[14] For the calculation of sectoral employment shares, we chose not to rely on female labor only, despite the fact that employment opportunity for women is the primary purpose of this variable. The inclusion of men in the calculation of the sectoral employment shares is necessary as male labor tends to be less concentrated in specific industrial branches and employment rates are generally much higher. The increase in sample size helps to improve the representativeness of the estimates for the sectoral employment shares, both for the occupational census as well as the marriage records.

[15] For an overview of the SIC, see Ruggles *et al.* (2015), Integrated, variable "IND1950".

Table B1. *Mean values for continuous variables by decade*

	Mean	1812–1819	1820–1829	1830–1839	1840–1849	1850–1859	1860–1869	1870–1879	1880–1889	1890–1899	1900–1909	1910–1919	1920–1929
Sectoral share (%)													
Agriculture and fishing	33.9	38.0	37.5	38.9	38.6	39.0	39.1	38.0	35.4	33.7	30.7	28.8	24.3
Coal mining	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	1.1	1.6
Peat extraction	1.3	0.5	0.7	0.9	0.9	1.1	1.1	1.3	1.5	1.6	1.5	1.5	1.7
Construction	6.5	4.3	4.7	4.8	4.9	5.1	5.6	6.2	6.6	6.9	7.8	8.0	7.7
Food, tobacco, and bev	4.3	3.6	3.5	3.5	3.7	3.7	3.7	3.9	4.3	4.9	5.3	4.9	4.7
Textile and app. mnf.	10.4	12.5	12.6	12.0	12.2	11.6	10.6	9.8	9.8	9.7	9.5	9.0	10.1
Metal and mach. mnf.	3.1	1.8	1.9	1.9	2.1	2.2	2.3	2.5	2.7	3.0	3.7	4.5	5.4
Paper and chem. mnf.	1.2	0.6	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.5	1.6	1.8
Glass, pottery, misc. mnf.	5.0	3.5	4.0	4.1	4.3	4.6	4.6	4.9	5.2	5.6	5.4	5.6	5.7
Transportation and public utilities	6.0	4.7	4.5	4.4	4.7	4.7	4.9	5.2	5.4	5.9	7.1	7.6	8.4
Wholesale and retail trade	8.6	7.1	7.1	6.7	6.8	6.6	6.6	7.0	8.0	8.9	10.0	10.4	12.2
Finance, insurance, and real estate	0.9	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	1.0	1.2	1.6
Personal, professional, and public services	18.4	22.8	22.2	21.4	20.5	20.0	19.9	19.6	19.3	17.6	16.3	15.7	14.9
GDP p. capita (log)	5.68	5.09	5.23	5.33	5.38	5.45	5.50	5.60	5.76	5.76	5.83	5.91	6.14
Bride age	26.9	28.0	27.8	28.1	28.0	28.3	28.2	27.6	26.7	26.4	26.0	25.8	25.7

Notes: mean values for all observations in our sample of the marriage records for seven Dutch provinces. Source: see text.

The municipalities that have less than 5,000 inhabitants are grouped together by province in the 1899 census. To get individual estimates of the sectoral employment shares for these smaller municipalities, we turn to the marriage records instead. For each municipality, we assign the occupations as reported between 1890 and 1899 by the grooms, brides, and both parents of the brides and grooms to each of our thirteen sectors on the basis of a correspondence table between the HISCO and SIC provided by the Integrated Public Use Microdata Series.[16] We thus implicitly assume that not just the bride and groom, but also the parents reside within the municipality where the marriage was recorded. A robustness check using only the occupation of the brides and grooms reveals that the estimates for the sectoral employment shares are by and large insensitive to this assumption. The inclusion of the parents' occupations in the estimation does increase the observation count per municipality, however, which is particularly helpful for the smallest municipalities that witnessed fewer marriages. We then compare the resulting average sectoral employment shares for the groups

[16] See Ruggles *et al.* (2015), Integrated, variables "OCCHISCO" and "IND1950".

Table B2a. *Summary of employment for the census year 1899, provinces included in regression*

	Drenthe	Gelderland	Groningen	Limburg	Noord Holland	Over-ijssel	Zeeland
Included in regression	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population	222,697	775,693	260,585	437,385	1,880,382	424,765	367,145
Labor force (aged 16–65) of which	125,839	448,202	242,070	251,434	686,674	244,227	207,660
Men, married	37,828	117,827	69,676	61,326	197,794	69,168	59,443
Men, unmarried	29,316	110,427	49,831	67,315	132,874	55,935	44,077
Women, married	38,755	128,890	76,019	66,491	217,179	74,410	63,955
Women, unmarried	19,940	91,058	46,544	56,302	138,827	44,714	40,185
Sectoral share							
Agriculture and fishing	54%	43%	41%	48%	21%	40%	55%
Mining	10%	0%	1%	2%	0%	2%	0%
Construction	4%	7%	6%	7%	9%	6%	5%
Food, tobacco, and bev	4%	4%	6%	4%	7%	5%	3%
Textile and app. mnf.	4%	7%	7%	7%	8%	17%	3%
Metal and mach. mnf.	2%	3%	4%	2%	5%	3%	3%
Paper and chem. mnf.	0%	1%	2%	1%	2%	1%	0%
Glass, pottery, misc. mnf.	2%	7%	2%	7%	4%	3%	1%
Transportation and public utilities	5%	6%	8%	4%	9%	6%	7%
Wholesale and retail trade	5%	6%	9%	4%	14%	6%	7%
Finance, insurance, and real estate	0%	0%	0%	0%	1%	0%	0%
Personal, professional, and public services	11%	15%	16%	14%	22%	12%	15%
FLFP							
Married, aged 16–65	9%	9%	11%	12%	8%	10%	21%
Unmarried, aged 16–65	44%	43%	48%	51%	46%	56%	50%

Source: Centraal Bureau voor de Statistiek Census 1899. Vol. 2016.

Table B2b. *Summary of employment for the census year 1899, provinces not included in regression*

	Friesland	Noord-Brabant	Utrecht	Zuid-Holland
Included in regression	No	No	No	No
Population	340,252	553,842	251,034	1,145,374
Labor force (aged 16–65)	197,268	326,947	143,281	652,147
of which				
Men, married	58,767	80,993	38,820	185,182
Men, unmarried	39,389	82,921	31,378	124,820
Women, married	63,384	86,930	42,682	203,765
Women, unmarried	35,728	76,103	30,401	138,380
Sectoral share				
Agriculture and fishing	42%	40%	24%	17%
Mining	1%	0%	1%	0%
Construction	5%	6%	9%	9%
Food, tobacco, and bev	6%	7%	6%	6%
Textile and app. mnf.	5%	14%	8%	8%
Metal and mach. mnf.	3%	3%	4%	6%
Paper and chem. mnf.	1%	1%	1%	2%
Glass, pottery, misc. mnf.	2%	3%	3%	4%
Transportation and public utilities	8%	5%	9%	10%
Wholesale and retail trade	10%	6%	10%	13%
Finance, insurance, and real estate	0%	0%	1%	1%
Personal, professional, and public services	17%	14%	23%	23%
FLFP				
Married, aged 16–65	8%	9%	8%	8%
Unmarried, aged 16–65	45%	54%	48%	47%

Source: Centraal Bureau voor de Statistiek Census 1899. Vol. 2016.

of smaller municipalities per province to the shares derived listed in the 1899 census. We normalize the shares obtained from the marriage records to make them fully compatible with the estimates in the census.

As a final step, we look at the change in sectoral composition over time. For each municipality, both large and small, we first estimate the average sectoral employment shares for all twelve periods, solely on the basis of the marriage records, using the procedure described above. We then determine the change in shares for each period with respect to the base period 1890–1899. We extrapolate the shares we obtained from the occupational census for the base period on the basis of these changes. Generally, the resulting shares will not sum to one for each municipality in all the different periods. We solve this by again normalizing the shares for each combination of municipality and decade.

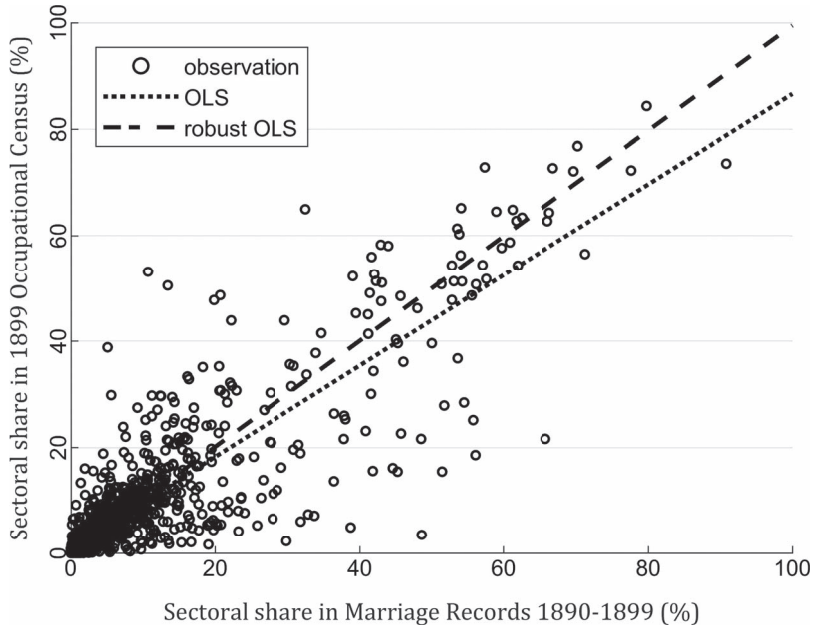

Figure B1. sectoral the marriage records and the 1899 occupational census

B Robustness

For the 103 largest municipalities, we can directly compare the sectoral employment shares observed in the 1899 occupational census and those derived from the 1890–1899 marriage records. Figure B1 below plots the shares for all sectors in the (large) municipalities from the marriage records against the shares from the 1899 census. The Pearson correlation between both sets of shares is a reassuringly high 0.87. Ranking the sectors within each municipality from 1 (biggest) to 13 (smallest) yields a Spearman rank correlation of 0.86. Comparing shares across municipalities, the marriage records correctly identify sixteen of the twenty-five municipalities with the highest shares for each sector on average. This shows that, although the sectoral employment shares derived from the marriage records are not identical to those listed in the 1899 census, from the reported occupations in the marriage records, we are able to identify the dominant sectors and overall obtain a credible estimate of the employment structure in each municipality.

In Appendix C, we include a sensitivity check based on sectoral employment shares calculated solely on the basis of female labor. The procedure is identical to the one described above, but we excluded the responses from all men in both the occupational census and the marriage records. The results from the logistic regression are not materially affected by the alternative estimates for sectoral employment shares.

Appendix C. Sensitivity checks

This appendix provides four additional robustness checks. First, in model (4), we exclude all 334,000 observations from Amsterdam, which, given its large size and diverging labor market, may skew the results of the logistic regression. Second, in model (5), we replace the sectoral

Table C1. *Odds ratios for brides stating an occupation ("no occupation" = 0)*

	Baseline (2)	Excluding Amsterdam (4)	Shares women (5)	Father HISCLASS (6)	Bride age ≤30 (7)
Occupational status of groom (unskilled farm workers = 1.00)					
Upper class	0.196	0.188	0.195	0.319	0.178
White-collar middle class	0.297	0.293	0.291	0.390	0.267
Skilled workers	0.535	0.510	0.512	0.611	0.509
Farmers	0.410	0.410	0.403	0.508	0.357
Lower-skilled workers and farm workers	0.715	0.716	0.678	0.801	0.704
Unskilled workers	0.867	0.910	0.800	0.939	0.863
Period of marriage (1920–1929 = 1.00)					
1812–1819	1.742	2.157	1.329	1.863	1.772
1820–1829	2.157	2.686	1.551	1.986	2.124
1830–1839	2.434	3.030	1.702	2.155	2.383
1840–1849	2.300	2.593	1.631	1.979	2.214
1850–1859	2.027	2.265	1.501	1.695	1.897
1860–1869	1.661	1.799	1.249	1.372	1.546
1870–1879	1.533	1.618	1.170	1.328	1.474
1880–1889	1.411	1.414	1.086	1.301	1.388
1890–1899	0.983	1.185	0.777	0.934	0.981
1900–1909	0.889	1.145	0.752	0.860	0.894
1910–1919	0.901	1.092	0.814	0.893	0.914
Rural or urban municipality	0.946	0.959	0.946	0.903	0.896
GDP p. capita	0.580	0.633	0.567	0.566	0.605
Bride age	1.023	1.019	1.014	1.032	1.054
Sectoral employment shares in municipality (agriculture and fishing = 1.000)					
Coal mining	1.031	1.038	1.018	1.023	1.033
Peat extraction	1.039	1.042	1.031	1.030	1.041
Construction	0.961	0.961	0.943	0.964	0.966
Food, tobacco, and beverages mnf.	0.975	0.974	0.946	0.967	0.978
Textile and apparel mnf.	1.041	1.023	1.041	1.035	1.041
Metal and machinery mnf.	1.026	1.034	0.899	1.033	1.032
Paper and chemical mnf.	1.009	1.044	0.981	0.977	1.011
Glass, pottery, misc. mnf.	1.066	1.082	1.050	1.066	1.080
Transportation and public utilities	1.001	0.964	0.925	0.987	0.994
Wholesale and retail trade	0.951	0.980	0.923	0.937	0.950
Finance, insurance, and real estate	0.876	0.974	1.135	0.893	0.872
Personal, professional, and public serv.	1.064	1.067	1.035	1.063	1.070
Occupational status of bride's father (unskilled farm workers = 1.00)					
Upper class				0.305	
White-collar middle class				0.411	
Skilled workers				0.611	
Farmers				0.498	
Lower-skilled workers and farm workers				0.707	
Unskilled workers				0.899	
Municipality dummies	Yes	Yes	Yes	Yes	Yes
Observations	1,529,470	1,196,338	1,529,470	838,743	1,203,068

Notes: $P < 0.01$, $P < 0.05$, $P < 0.1$. All models include a full set of dummies for municipalities.

employment shares for each municipality in our sample, which are currently based on the sectoral employment shares for both men and women, by shares based solely on female labor. This prevents skewing the local labor market shares by jobs exclusively performed by men, but using the female labor force for this purpose could introduce a fair amount of circularity in the model, where the extent of UFLFP in a municipality is explained by itself. Third, in model (7), we include the occupational status of the bride's father as a control variable proxying the brides' family income. Fourth, in model (8), we exclude all brides over the age of 30, which are more likely to have previously been divorced or widowed and may be more likely to work. The results can be compared to the baseline model (2).

Overall, the results appear to be robust. In all models, the occupational status of the groom is highly significant and decreases with increased status. The odds ratios for earlier decades are still larger than for the reference category—indicating social attitudes played a role in the general decrease in UFLFP over time—but remain below 3 for nearly all decades. The odds ratios for rural municipalities are negative but insignificant in all models, while the odds ratios for GDP per capita and brides' age change little and remain highly significant. Lastly, estimates for the thirteen sectors remain largely unaffected. Sectors that show significant odds ratios in model (2) tend to do so in the other four models as well. None of the odds ratios for the sectoral employment shares change sign, with the exception of metal and machinery manufacturing and finance, insurance, and real estate in model (5). These relatively small sectors employed few women—the 1899 census reported just 418 women working in metals manufacturing and 59 in FIRE, out of 156,000 gainfully employed—and were highly concentrated in just a handful of municipalities. Basing the sectoral employment shares solely on female labor might thus lead to a less representative distribution by municipality and increased variability over time, particularly for the small sectors—i.e., coal mining and construction as well.

The inclusion of the father of the bride's occupational status in model (7) had a notable impact on the odds ratios for the groom's occupational status. The future husband having a higher status occupation still impacted the likelihood of the bride reporting an occupation negatively, but to a lesser degree than in our baseline model. The groom's and father of the bride's occupational status are correlated (0.44), meaning that marriages within the same social strata were common. This leads us to prefer the original specification of model (2), excluding the father of the bride's occupational status.

Appendix D. Note on decomposition

To illustrate the decomposition of Dutch UFLFP in Section 6, consider the hypothetical two-period, two-sector example in table D1 below. At time 0, there are eight municipalities entirely devoted to the production of agricultural goods, while in two municipalities, all workers are engaged in business services.[17] As the agricultural sector offers more opportunities for women's work, UFLFP in the agricultural municipalities is higher than in the service-oriented municipalities. Total UFLFP, the average of the ten municipalities' UFLFP in period 0, is 38 percent.

In the next period, three municipalities move away from agriculture and specialize in business services instead. At the same time, average UFLFP in both sectors declines

[17] Note that the number of unmarried women residing in each hypothetical municipality is identical and does not change over time.

Table D1. *Stylized example of decomposition UFLFP*

	Period 0		Period 1	
	Muni.	UFLFP	Muni.	UFLFP
Agriculture	8	40.0	5	36.0
Business services	2	30.0	5	27.0
UFLFP at sector shares of:			Period 0	Period 1
Period 0			38.0	34.2
Period 1				31.5
Contribution from change in:			Change	
Sectoral employment shares			−2.7	
Residual			−3.8	
Total			−6.5	

by 10 percent, for instance, as a result of unmarried women retreating from the labor force as a reaction to changing attitudes towards female labor. In period 1, the overall UFLFP is now 31.5: a reduction of a little over 17 percent compared to the average of period 0.

Two forces are driving the decline in UFLFP in the stylized example below. The decline in UFLFP was caused by a shift towards sectors with low demand for female labor and by changing social norms. To decompose these effects, we can calculate the counterfactual UFLFP, reflecting a scenario in which the structure of the economy remains unchanged over time. If we take period 0's sectoral employment shares and multiply by period 1's UFLFP, the total UFLFP would have been 34.2 percent. The difference with the observed UFLFP in period 1, 2.7 percentage points, can be attributed to the first factor, changes in sectoral employment shares. The residual change, 3.8 percentage points, reflects the second factor, changing social norms.

This decomposition can also be applied to the evolution of UFLFP in the Netherlands during the period 1812–1929. To fully break down the decline in UFLFP in its underlying constituents, we need to take the change in all variables included in our model into account. Partial indices that include only a subset of the characteristics driving UFLFP can be constructed for all variables in our regression models, except for the period of marriage, which is captured by the residual. For example, the partial index for the shift in the share of employment in the various economic sectors (i.e., sectoral employment shares), $F^{\bar{s}_0}$, is given below.

$$F_t^{\bar{s}_0} = \ln \frac{\sum_i^{N_t} \Pr\{y_{it} = 1 \,|s_{it}, x_{it}\}}{\sum_i^{N_t} \Pr\{y_{it} = 1 \,|\bar{s}_0, x_{it}\}}. \tag{2}$$

Equation (2) uses the coefficients from model (2) in table 2 in the main text to predict the likelihood of brides stating an occupation at time t under two scenarios. The numerator represents the benchmark case, in which the sectoral employment shares (s_t) as well as all the other independent variables (x_t) are as observed in the marriage records for this period. The denominator represents the counterfactual case, where the sectoral employment shares are set to the average of the base period 0 ($\bar{s}_0$), while the other independent variables still reflect the observed values at time t. By taking the log of the ratio of the benchmark and this

counterfactual case for all N brides in our sample at time t, the contribution of the shift in sectoral employment shares to the change in UFLFP between period 0 and t is obtained.

A notable drawback of the decomposition in equation (2), which closely resembles a Paasche index, is that it is sensitive to the choice of base year. Generally, reliance on the average sectoral employment shares from the earlier decades will undervalue the contribution of the sectoral shifts to UFLFP, while choosing a later base will overvalue its impact. To contain this potential bias, we adopt a chaining procedure, estimating the contribution for pairs of adjacent decades based on the average sectoral employment shares for both the respective decades. Next, we sum the contributions for all the pairs running from the first period to period t to obtain the change in UFLFP, which is base-invariant. Note that equation (3) resembles a chained Törnqvist index.

$$F_t^{\bar{s}} = \sum_{\tau=1}^{t} \left(\ln \frac{\sum_i^{N_\tau} \Pr\{y_{i\tau} = 1 \,|s_{i\tau}, x_{i\tau}\}}{\sum_i^{N_\tau} \Pr\{y_{i\tau} = 1 \,|\bar{s}_{\tau-1}, x_{it}\}} + \ln \frac{\sum_i^{N_{\tau-1}} \Pr\{y_{i\tau-1} = 1 | \bar{s}_\tau, x_{i\tau-1}\}}{\sum_i^{N_{\tau-1}} \Pr\{y_{i\tau-1} = 1 \,|s_{i\tau-1}, x_{i\tau-1}\}} \right) / 2. \quad (3)$$

To fully decompose the decline in UFLFP in its underlying constituents, we take the change in all variables included in our model into account.