

The effect of serfdom on labor markets[†]

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Abstract

This research provides evidence on how restrictions on labor mobility, such as serfdom and other types of labor coercion, impact labor market outcomes. To do so, we estimate the impact of a large shock to labor mobility in the form of the reintroduction of serfdom in Denmark in 1733, which was targeted at limiting the mobility of farmhands. While many economists, historians and others have argued that serfdom had an impact on the mobility and wages, revisionist historians have countered that workers found ways to circumvent the restrictions imposed by serfdom. Using a unique data source based on 18th century estates, we test whether serfdom affected the wages of farmhands more strongly than other groups in the labor market using a differences-in-differences approach, and find evidence consistent with a strong negative effect on serfdom following its introduction. We also investigate whether one mechanism was that boys with rural backgrounds were prevented from taking up apprenticeships in towns, and find suggestive evidence that this was indeed the case. Thus, our results suggest that serfdom was effectively reducing mobility.

Keywords: Serfdom, labor mobility, coercion

JEL Classification: J3, N33, P4.

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1. Introduction

How do efforts to reduce the mobility of workers affect labor market outcomes? The present paper presents new evidence on this question by turning to a key transformation in the history of Europe was the move from feudal labor markets to modern labor markets in which people can choose where to work and live as pointed out by Acemoglu, Johnson and Robinson (2005: p.440). According to these authors, feudal institutions such as serfdom undermined incentives and led to underdevelopment “by restricting labor mobility and by removing the role of the labor market in allocating jobs.” (p. 441). Many historical accounts are largely in line with this view,¹ but as pointed out by e.g. Dennison (2006, p.77), revisionist historians have suggested that farmhands found ways of getting around the mobility restrictions associated with serfdom for which reason the effects could very well be negligible.²

The present paper provides new quantitative evidence on the effects of reducing mobility in the labor market by exploiting the reintroduction of serfdom in Denmark in 1733 which were targeted at tying male farmhands to the estate in the area in which they were born. Agricultural workers were largely unskilled, and as they became bound to a given estate this was likely to decrease their outside option, and thus their wages. This means that their wages are likely to decrease compared to other groups in the labor market as e.g. the mobility of craftsmen would be much less affected by serfdom.³ Serfdom could also serve to prevent young men from the countryside from moving out of the rural sector via an apprenticeship in a town.

We exploit a unique micro-level dataset, which contains information on the wages, occupation and geographical location as well as other characteristics of individuals selling their labor to an estate. This allows us to evaluate whether there was a differential impact on the farmhands as compared to other groups in the labor market in a differences-in-differences approach. Given that the micro-level nature of the data it allows us to control for common year effects, fixed effects for occupation, region,

¹ Recent examples include Ogilvie (2007) and Ogilvie and Carus (2014).

² See e.g. Hagen’s (2002) study of Prussia, which emphasizes that serfdom and growth were compatible or the discussion in Clark (2007: pp.220-223)

³ Bobonis and Morrow (2010) show that when unskilled labor is coerced to work for e.g. landowners, then the relative wage of skilled workers increases. We return to potential mechanisms in Section 6.

gender, and we can control for many confounding factors. We can also control for the presence of regional trends by controlling for year fixed effects which vary by geographical area. We complement this analysis with suggestive evidence on reduced opportunities for apprenticeship for young men from rural areas after serfdom was introduced using micro data for apprentices.

Apart from the unique data source and the possibility to implement differences-in-differences estimation, studying the case of serfdom in Denmark also has several other advantages. First, while there are many historiographical analyses of serfdom (e.g. Domar, 1970; North and Thomas, 1971; Brenner, 1976), there is relatively little quantitative evidence on the effects of serfdom on labor market outcomes for Western Europe. The reason is that serfdom ended in the early sixteenth century in most of Western Europe which means that data are largely unavailable. Some evidence exists for Eastern Europe (as discussed below) where the emancipation of the peasantry came much later, see e.g. Persson and Sharp (2015, p.90-97). Denmark is an exception to the common Western European pattern as the data described above pertain to the period in which serfdom was re-introduced, as also pointed out by Rudé (1972, p. 31), who refers to Denmark as the “only major exception to the sharp east-west antithesis”. Thus, studying the re-introduction of serfdom in Denmark offers a unique possibility to study the impact of serfdom on a western European country. Second, the rules regarding serfdom were gradually changed to pertain to bigger age groups. In 1733, serfdom implied that a farmhand in the age group 14-36 years could not leave the estate which he belonged to from birth. The age group was extended to 9-40 years in 1742; and to 4-40 in 1764. The reform of 1788 meant that the age group was yet again 14-36 years. This allows us not only to investigate the immediate effect of serfdom under the 1733 rules, but we can also dig into whether tightening the rules was effective. While the Danish case study comes with these advantages, it should be kept in mind that the 1733 serfdom in the Danish context was about putting restrictions on the mobility of male peasants to secure the necessary labor for the manors. By contrast, in the Russian context, peasants were practically the property of the gentry and markets for serfs existed (Markevich and Zhuraskaya, forthcoming; Domar and Machina, 1983). Drawing largely on the experience from Russia and Eastern European countries, Ogilvie and Carus (2016, p.474) describe serfdom as follows: “A serf was legally tied to the landlord in a variety of ways, typically by being

prohibited from migrating, marrying, practicing certain occupations, selling certain goods, participating in factor and product markets, or engaging in particular types of consumption without obtaining permission from his landlord.” As this description shows, our study exploits variation in one of the dimensions of an economy with serfdom, namely the mobility of farmhands. While this means that the Danish case is somewhat different from the Russian and Eastern European cases, it allows us to look into the mobility dimension of serfdom.

Our paper contributes to the quantitative literature on the effects of serfdom, as well as to the broader literature on institutions and policies that restrict labor mobility. Quantitative studies of serfdom include Domar and Machina (1983), Nafziger (2012), Markevich and Zhuraskaya (Forthcoming) and Klein and Ogilvie (2016).⁴ Domar and Machina (1983) study the correlates of the prices of serfs in the context of Russia; Nafziger (2012) studies the impact of abolishing serfdom in Russia for the non-farm activity of serfs as compared to non-serfs. Markevich and Zhuraskaya (Forthcoming) study the effects on agricultural productivity, industrial output and peasant’s nutrition of the abolition of serfdom in Russia. Klein and Ogilvie (2013) study the non-farm activity of peasants using cross-sectional data from Bohemia in the present day Czech Republic. None of these studies focus on wage effects due to mobility restrictions, none of them evaluate the impact of the introduction of serfdom, and finally all of them focus on Eastern European serfdom.⁵

Our paper is also strongly related to evidence on the effects of other historical institutions that limited labor market mobility. Naidu (2010) presents an analysis of anti-enticement fines and demonstrates that these reduced the mobility of share croppers using data for Arkansas. He also provides suggestive evidence that these laws reduced state level agricultural wages in the American south. Naidu and Yuchtman (2012) study the impact of the master and servant law, which made breach of contract a criminal offence in Great Britain. They study how the number of prosecutions responds to demand shocks as well how county level wages responded to the abolition of the law with the effect being

⁴ Buggle and Nafziger (2016) who explore the link between historical serfdom and present day well-being.

⁵ Ogilvie and Edwards (2000) analyze data for Bohemian villages, but do not consider the effects on wages.

larger in areas with more prosecutions. Two features of our study set it apart from these studies. First, we focus on serfdom which is the prime example of an institution reducing labor mobility in historical Europe. Second, we can use individual level data in our differences-in-differences estimation as well as individual level data on whether apprentices were recruited from the countryside.

Our paper also speaks to the literature on restrictions on labor mobility in developing countries today as pointed out by many authors. One example is Genicot (2002, p. 102), who notes that: “The incidence of bonded labor and serfdom has been amply documented throughout history and in all parts of the world. [...] Perhaps less well-known is the extent to which these institutions persist in more recent times.” Acemoglu and Wolitzky (2011) concur with this observation and argue that labor transactions throughout most of history and a significant fraction of such transactions in developing countries today are coercive.⁶ Yet another example is the Chinese Hukou system, which serves to restrict rural-urban migration, see Whalley and Zhang (2007) who provide model simulations of the impacts of this system. Our empirical analysis provides evidence from plausibly exogenous variation to cast light on the quantitative impact of mobility restrictions, which is arguably difficult in a modern context.

We finally speak to the historiographical literature on serfdom. This is relevant for the eastern European and Russian contexts. It is clearly also relevant for the Danish historical context. Mirroring the international literature, the traditional view has been that serfdom was effective in restricting mobility and wage growth for farmhands. The Danish economic historian Hansen (1984, p. 43), for example, suggested that serfdom was effective in securing the estates a cheap, dependent labor force. In a similar vein, Andersen et al. (2004, p.46) argue that ‘access to unfree labor supplied by the adscripted men on the estate must have guaranteed an upper ceiling for the wages of others.’⁷ By contrast, Løgstrup (1987, 1988) takes a view closer to that of revisionist historians, and emphasizes the existence of some geographical mobility. None of these authors offer econometric analyses for

⁶ Coerced labor has been a persistent feature in developing countries such as Brazil, India and Pakistan throughout the twentieth century, see the contributions in Andrees and Belser (2009).

⁷ The traditional view can be traced back at least to Falbe-Hansen (1888). The Danish literature often uses adscription rather than serfdom to refer to the fact that people living in the countryside were bound to the land.

these assertions and, with unique data at hand, this paper will begin to fill this gap in our understanding of serfdom.

The rest of the paper is organized as follows. Section 2 gives a brief history of serfdom in Denmark. Section 3 describes the empirical strategy. Section 4 describes the data. Section 5 presents the analysis. Section 6 offers interpretation and discusses mechanisms, whereas Section 7 concludes.

2. Historical background

This section briefly details the history of serfdom in Denmark to inform our investigation of its labor market implications. We first discuss the early serfdom which applied to only part of the country (the eastern islands of Zealand, Lolland and Falster). Next, we discuss the introduction of serfdom in 1733. Finally, we discuss the changes made to serfdom during the 18th century.

Early serfdom – vornedskab

At the end of the 15th century, serfdom known as vornedskab was established on the eastern islands of Denmark. As is also true for the re-introduced serfdom it was directed at male farmhands. Christensen, Milthers and Hansen (1934, p.40) note that the sons of farmhands were tied to the same estates as their fathers. Thus, they were not at liberty to move. Farmhands would not be the property of a landlord, but they were tied to a particular estate. If the farmhand could pay a fee, he could be allowed to work elsewhere. While the farmhands were not slaves, Christensen et al. (1934) does mention that the buying and selling of farmhands by landlords did take place. While there were earlier attempts at abolishing the “vornedskab”, it was not until 1702 that it was finally abolished, and then only for children born after 25th August 1699. This leads Munch (1974, p.308) to conclude that it would not start to have any effect until 1717, when the first free workers would start to enter the labor market.

Reintroduction of serfdom

As mentioned in the introduction, serfdom was reintroduced in 1733 for all males in the age group 14 to 36 years old, and this time for the whole of the country. It was mainly aimed at ensuring farmhands for the estates, but in principle every male in the age group 14 to 36 years was now tied to the estate. According to Olsen (1933, p. 63), the main motivation was to ensure low wages in the agricultural sector as run by the estates. Prior to 1733, farmhands had become freer at least de jure (Olsen, 1933: p.64) due to the abolition of the early serfdom on the eastern islands. Yet, in the western part of the country, they had not been limited in their mobility prior to 1733 to the same extent. Following the great Nordic war from 1709-1720 (Christensen et al., p. 71), agricultural prices had been in decline which turned into an agricultural crisis, which gave the landlords momentum for getting support for re-introducing serfdom from the government. Domar (1970) proposed a theory of serfdom introduction based on scarcity of labor as compared to land. The Danish historical narrative is in line with this except that serfdom was introduced by the political system, which Domar himself acknowledged is not in his model. Our test is on the impact in of serfdom, but Domar's theory indicates that the agricultural crisis or the end of *vornedskab* could have been important for which reason we investigate whether there were early impacts prior to serfdom.

Tightening and abolition of serfdom

From 1742, serfdom was tightened to the age group 9 to 40 years old. Further edicts from the 1740s link the reduced mobility to the presence of cattle plague (Christensen et al., p. 75). From 1764, serfdom was further tightened to the age group 4 to 40 years. As part of wider agrarian reforms, serfdom reverted to the 1733 version in 1788 and was finally abolished in 1800.⁸

3. Empirical strategy

We carry out a difference-in-difference estimation on a dataset, which covers the period 1705-1799. We pursue two strategies. One in which we treat the reintroduction as from running from 1733 to 1799, and another in which we allow the effects to be time-varying according to the periods described above.

⁸ The agrarian reforms also included the enclosure movement, see e.g. Christensen (1925).

We proceed by estimating the following equation for the period 1705-1799 for the log of wages as denoted by lnw_{it} :

$$lnw_{it} = farmhand_{it}serfdom_{1733}\beta + \alpha_t + X_{it}'\gamma + \varepsilon_{it},$$

i indicates individual and t indicates time. $farmhand_{it}$ indicates whether the individual observed is a farmhand, and finally $serfdom_{1733}$ is a dummy which is equal to 1 from 1733-1799. The parameter of interest is β , which measures the impact of serfdom on the farmhands. α_t indicates year fixed effects.⁹ X_{it} is a vector of control variables which include e.g. fixed effects for occupations (as described below), region fixed effects,¹⁰ gender fixed effects, seasonal fixed effect and other control variables.

The fact that serfdom was tightened and then loosened subsequently might influence the result and we therefore also more flexible estimate models in which take advantage of this fact and estimate:

$$lnw_{it} = farmhand_{it}serfdom_{1733}\beta_1 + farmhand_{it}serfdom_{1742}\beta_2 + farmhand_{it}serfdom_{1764}\beta_3 + farmhand_{it}relaxation_{1788}\beta_4 + \alpha_t X_{it}'\gamma + \varepsilon_{it}$$

Here $serfdom_{1764}$ is a dummy from 1764-1787, $relaxation_{1788}$ is a dummy for the period 1788-1799.

The more flexible model also allows for a check on the common pre-trend assumption which assumes that the trend of farmhands was parallel to those of other occupations. In some models, we therefore include a dummy for the period after the earlier serfdom ceased to have influence.

4. Data

For implementing the aforementioned regression models, we need a measure of individual (log) wages as well as an indication of which individuals are unskilled farmhands. Fortunately, it turns out

⁹ Effects for years capture common shocks such as the cattle plague in the 1740s.

¹⁰ We include region fixed effects as the literature argues that the group of manor owners must have comprised a kind of employer organisation at the regional level, and they may have had some agreements on wages.

that for the eighteenth century, a vast amount of data was collected by the Danish Price History Project, which was started at the University of Copenhagen in 1939 and terminated in 2004. The data were collected from accounts and material from the Danish government, the royal court and its property, the army, firms, churches, and from local and private archives. Although these data are referenced and briefly summarized in the two-volume *History of Prices and Wages in Denmark 1660-1800*, they have not otherwise been exploited. The period covered is 1660-1800, which overlaps the age of absolutism, and represents a unique dataset on labor and product markets during that time, unrivaled to our knowledge in detail by anything available for other countries. For our purposes, we need a measure for our left-hand side variable, namely wages. Radu (2015) details how the wage data are harmonized at the individual level, though we note that the wage series have been corrected for in-kind payments. We are not able to track individuals across time, but we have data for individuals working for a total of 16 estates in the full dataset covering 1705-1799.¹¹ This implies that the dataset consists of repeated cross-sections available at an annual level. For measuring whether a person is a farmhand, we use the fact that we have information on occupation, which we have coded according to the HISCO system (Historical International Standard of Classification of Occupations).¹² We code as farmhands those who are designated as “farm laborers”, “day laborers” and “laborers”¹³ as our baseline, but also consider specifications in which we only use “farm laborers”, which arguably captures most closely those who worked the field. To provide an impression of the data, Table 1 summarizes data for the three regions of Jutland, Funen and Zealand. The table reveals that for many estates, we do not have observations in the period which contains the reintroduction of serfdom (1705-1741), and data are thickest for the period 1764-1787. The majority of farmhands for whom we have data are those who were allowed to work on other estates (see Olsen, 1950) for wages temporarily. Yet, we stress that given that landlords had the right to make the local peasants stay to

¹¹ We stop our data in 1799, the last year in which serfdom was in place.

¹² See <http://historyofwork.iisg.nl/>.

¹³ Farm laborers perform a variety of tasks in growing crops and breeding and raising livestock according to the HISCO classification scheme. Laborers performs lifting, carrying, stacking, shoveling, digging, cleaning and similar tasks by hand, using simple laboring tools such as pick, shovel, wheelbarrow and street broom where necessary. Day laborers perform the same range of tasks as laborers using the same types of tools as a laborer (9-99.10), but is specifically hired and paid by the day.

farm the land on their estates, the wages of those who were allowed to move even temporarily is also likely to be affected.

Table 1 about here

Other than occupation and wages, the data also provide information on gender, the season of the year that the work was carried out, job title (master or ordinary craftsmen), whether the individual is a child, and the location of the individual as given by region and estates.

Figure 1 about here

5. Results

This section presents the results from the estimation of our equation of interest. All standard errors are clustered at the level of the estate or alternatively at occupational level. We begin by discussing the main results as reported in Table 2. Column 1 shows a negative and statistically significant estimate of β , which is consistent with the view that serfdom did affect farmhands more strongly compared to other groups in the labor market. In column 2, we add region by year effects for Funen and Jutland, which never experienced mobility restrictions as other parts of the countries. The estimate remains negative, but significance is reduced to the ten percent level. The size of the coefficient is nonetheless of a similar magnitude as the one reported in column 1. In Column 3, we look at whether there were any differential effects across the periods in which the restrictions were either tightened or loosened. Overall, the effects for the four sub-periods seem similar and it cannot be rejected that they are the same. In column 4, we add begin to investigate whether there are pre-existing trends in the form of the abolition of the early serfdom as discussed above. As this would start to matter from 1717, when the first farmhands who were free of early serfdom turned 18, we interact a dummy for 1717-1732 with the farmhand dummy and obtain a positive yet statistically insignificant estimate to this variable. As the mobility restrictions were targeted male farmhands, we

check that the results are not driven by using women as the control group, and we find that the results are not driven by this, see column 5 in Table 2.

In addition to the flexible models in columns 3 and 4 in Table 2, we have also estimated a fully flexible model in which the farmhand dummy is interacted with year dummies. While this is a demanding specification, the results indicate that there are no negative and statistically significant coefficients prior to the introduction of serfdom in 1733, and the pattern of coefficients is such that most coefficients after 1732 are negative and significant so in a some of the years. As we do not have many observations per year, this is perhaps not surprising.

Table 2 about here

We next investigate the degree to which our results depend on using the full sample and the inclusion of certain occupations in the control group. These results are reported in Table 3. First, we re-estimated the baseline model on samples running from 1705-1741, 1705-1763 and 1705-1787. We note that the coefficient of interest is negative for the initial period before the first tightening, but it is statistically insignificant, see column 1. Once we extend the sample to 1763 as in column 2, the coefficient is very like the baseline estimate (see column 4) and is also significant at the five percent level. The same is true when we extend the sample further to 1787, see column 3. The fact that we do not observe any effects using only the period before the rules were initially tightened could be related to the fact that the sample is reduced to less than 800 observations. Once we increase the sample, we get much stronger results. Below, we report results suggesting that the effects on farm laborers were stronger than the other unskilled laborers we use in our measures. If we use the farm laborer category only in our measure, we find that the coefficient is larger than for our main result with a statistically coefficient of -0.37 for the whole sample. If we use the initial period only, then the coefficient is -0.51 and it is significant at the ten percent level. This suggests that the result for the initial period is driven by low power, as when we use those laborers treated more intensely, the effect seems to get stronger. This is also corroborated by the fact that we find a statistically significant effect for the first period when we estimate our model on the full sample as shown in Table 2.

We also investigate whether including certain occupations in the control group drive the results. A substantial amount of observations is for teachers who worked at the estates. As these may have been more mobile compared to other groups during serfdom, including them in the control group could affect the results. The result in column 5 suggests that this is only so to a limited effect as the effect remains negative and significant, though numerically similar. Excluding carpenters or masons also have little effect, and the same is true for farm servants, see columns 6-8.

Table 3 about here

Other robustness checks

As mentioned, there may have been differential effects on the three groups included in the serfdom measure. We already mentioned above that using just those we know for sure worked on the field produces stronger results. We can investigate this further by allowing for different effects of the types. When we do so, we find that the coefficient on the farm laborer interaction is -0.41 and significant at the five percent level. For day laborers it is -0.34, but only significant at the ten percent level. Finally, for laborers the coefficient is -0.257 and significant at the five percent level. These results are suggestive of some differences, though statistically speaking we cannot tell whether they are different.

Wages may arguably also correlate by occupations and we have therefore used an alternative clustering correction based on occupation and we find that significance increases for our coefficient of interest. We have also used two-way clustering both at estate and occupation level and again results are similar.

6. Discussion

All the results presented are consistent with the view that farmhands were negatively affected by the introduction of serfdom. In this section, we discuss interpretations as well mechanisms.

We noted that serfdom has partly been viewed as a response to an agricultural crisis with falling prices beginning after 1720. Yet, we note that wages of farmhands were not statistically significantly

different from other groups in society in the period 1717-1732, which marks the time that abolishment of *vornedskab* would start working. The same is true if we use an interaction for the period 1721-1732, which marks the period after the great northern war and the time at which prices started falling. We also note that using annual variation that there were no discernable pre-trends.

Our results necessarily allow for several mechanisms as to why the wages of farmhands are relatively low. One mechanism alluded to in the introduction is that farmhands could to a lesser extent exert their outside option by getting jobs at other estates as compared to e.g. craftsmen. The relatively stronger mobility of craftsmen may be attributed to the fact that they could more easily find jobs outside the village due to their education (Løgstrup, 1988) or they might have better options if they were to run away and migrate to another country (Olsen, 1933). Olsen (1933, p. 75) argues that the young craftsmen tied to an estate could easily find jobs abroad, and also argues that they were relatively numerous among those that ran away.

A related mechanism is that the supply of apprentices coming to the cities from the rural areas would contract as also suggested by Olsen (1933). If serfdom prevented young men from moving to other occupations, this would tend to weaken their outside options. This could also lead to a shortage in craftsmen in both cities and the rural sector which would mean that the relative wages of farmhands would decrease. To get some suggestive evidence on this mechanism, we employ micro-level data for the city of Odense for which information of the birthplaces of apprentices has been coded. These data include information on what type of guild the apprentice joined (e.g. for shoemakers, tailors etc.) with data points for 1700-1790 yielding a total of 516 observations.¹⁴

While we cannot employ a differences-in-differences approach in this setting, it is possible to test whether the probability the apprentice is recruited from the countryside declines from 1733. We do this by estimating the following linear probability model:

$$pr(\textit{apprentice from country side} = 1) = \alpha_{\textit{guild}} + \textit{serfdom}_{1733-1790}\gamma + \varepsilon_{it},$$

¹⁴ We do not have data points for each year meaning that for some years we have at least one observations, whereas for others we have none.

α_{guild} indicates a guild fixed effects and γ indicates the effect of serfdom on the probability of recruiting from the country. Now $\gamma < 0$ would be consistent with this mechanism. When we estimate the model, we find that $\tilde{\gamma} = -0.267$ (standard error clustered by guild = 0.028). Though, this could possibly indicate a general, negative trend for potential apprentices from the country unrelated to serfdom, we find that this is implausible given our evidence on rural wages.

We can also test whether the changes to serfdom mattered by allowing for separate coefficients for the four periods by estimating the following model:

$$pr(\text{apprentice from country side} = 1) = \alpha_{guild} + serfdom_{1733}\gamma_1 + serfdom_{1742}\gamma_2 + serfdom_{1764}\gamma_3 + serfdom_{1788}\gamma_4 + \varepsilon_{it},$$

The estimated equation becomes:

$$pr(\text{apprentice from countryside} = 1) = \alpha_{guild} - serfdom_{1733}0.188 - serfdom_{1742}0.309 - serfdom_{1764}0.251 - serfdom_{1788}0.24 + \varepsilon_{it},$$

The coefficients are all negative and statistically significant. Moreover, they are statistically different from each other. This suggests that changes to the affected age groups did matter for those who wanted to become apprentices – especially the tightening in 1742 seems to have mattered. Holmgaard (2003) argues that the background for changing the age to 9 years old was that the younger residents of the estate left before serfdom would apply to them.

As a final test of this, we investigated whether we observe effects in case we only estimate on data from 1733, and then code the dummy as 1 from 1742. We find that there is a negative coefficient, which is statistically significant at the 10% level, and so this suggests that the observed pattern is associated with serfdom and not simply general trends. The tightening in 1764 does not seem to have changed much and we find no detectable difference between the period 1742-1763 and the period 1764-1790. This may suggest that reducing the lower age from 9 to 4 would not matter much for the supply of apprentices.

In sum, these results suggest that possibilities for becoming apprentices for young men from the countryside diminished after serfdom as well as the tightening of the rules. As mentioned, there are other plausible mechanisms, and while we do not know whether the effect on recruitment of apprentices from serfdom is more important than migration out of the country, its presence suggests that the mobility of farm laborers were, in fact, affected by serfdom.

7. Conclusion

This paper offers new quantitative evidence on the impact of serfdom on the labor market by considering the effects of the wages on farmhands. The evidence is consistent with the more traditional historical view that serfdom did matter for the mobility of workers and the labor market in general. While, it is plausible that runaways as well as other ways to leave an estate alleviated the effect of serfdom, it appears to have kept wages down.

Thus, this evidence is in line with the view that institutions (such as serfdom) matter as suggested by economists and economic historians such as Acemoglu et al. (2005) and Ogilvie (2007, 2014). Our evidence can therefore be read as suggesting that restrictions on mobility do have negative impacts on the labor market and development overall.

Nonetheless, it should be recalled that serfdom may not only have had negative impacts. Olsen (1933), for example, links serfdom with the adoption of the labor-intensive field system of *Koppelwirtschaft*, which in the Danish context was associated with the establishment of modern dairying. Recent work by Jensen, Lampe, Sharp and Skovsgaard (2017) suggests that the dairies established in the 18th century were important for spreading knowledge on how to run dairies to ordinary peasants in the late 19th century. Since the cooperative dairies established in this period played a large role in the Danish economic take-off, it is possible that serfdom played some role. Research on other contexts (See Dennison, 2006) also highlight that serfdom may have had some positive effects, and we believe that investigating whether this was, in fact, the case is an important topic for future research.

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Regions and estates	Number of observations (all occupations)					Farmhands (% of total occupations)	Women (% of total occupations)
	Period						
	1661-1800	1705-1741	1742-1763	1764-1788	1789-1800		
Zealand	12554	440	3514	6826	1600		
Giesegaard (1721-1800)	436	12	109	302	13	34%	0%
Bregentved (1746-1800)	989	0	282	559	148	39%	1%
Gissfeld Household (1706 1740)	317	317	0	0	0	30%	26%
Holsteinborg (1748-1800)	927	0	39	207	681	40%	5%
Fuirendal (1756-1795)	1340	0	324	774	241	25%	18%
Sorø Academy (1740-1800)	466	0	44	261	161	5%	0%
Løvenborg (1752-1794)	6929	0	2427	4403	153	28%	1%
Gauno (1751-1800)	787	0	265	319	203	21%	2%
Juellinge (1726-1748)	136	111	24	1	0	4%	0%
Funen	5573	73	1061	2404	2035		
Taasinge (1725-1800)	3020	52	801	1199	968	26%	11%
Frederiksgade 1773-1800	1932	0	0	996	936	76%	21%
Erholm Søndergade (1723-1800)	621	21	260	209	131	56%	8%
Jutland	3347	218	286	1855	988		
Frijsenborg (1777-1800)	1250	0	0	899	351	23%	9%
Støvringgard (1734-1800)	722	35	132	323	232	24%	16%
Lindborg (1714-1799)	1309	117	154	633	405	51%	23%
Odden (1703-1732)	66	66	0	0	0	33%	0%

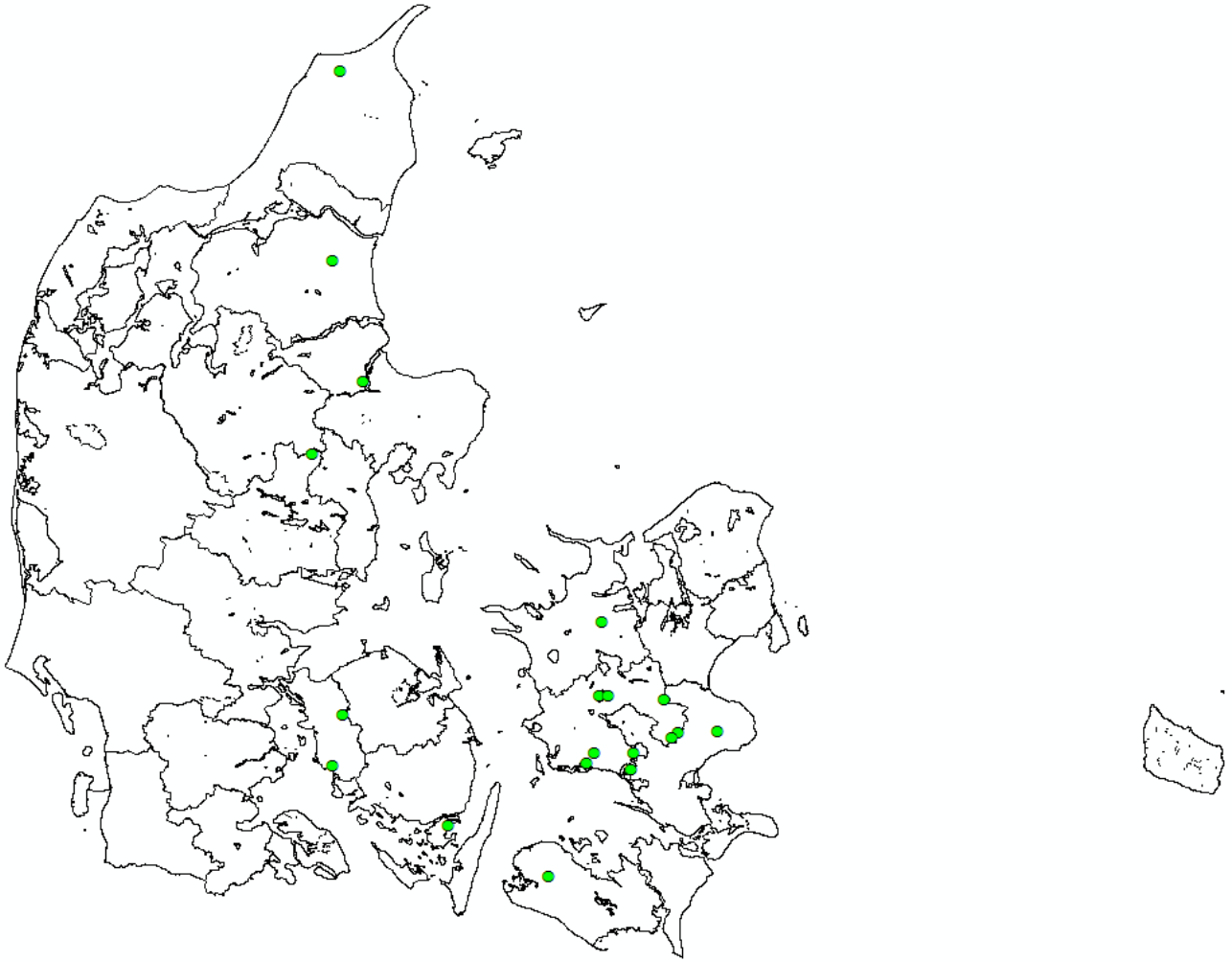


Figure 1: Map of Denmark.

Note: Green circles indicate location of manor.

Table 2: The main results, 1705-1799

	Dependent variable				
	Log wage				
	(1)	(2)	(3)	(4)	(5)
Serfdom x Farmhand	-0.351**		-0.255*		-0.394**
	[-2.322]		[-1.765]		[-2.561]
Period 1 x Farmhand		-0.395*		-0.387**	
		[-1.895]		[-2.223]	
Period 2 x Farmhand		-0.338*		-0.330*	
		[-2.093]		[-2.013]	
Period 3 x Farmhand		-0.362**		-0.355**	
		[-2.380]		[-2.842]	
Period 4 x Farmhand		-0.336*		-0.329**	
		[-1.914]		[-2.690]	
Post Vornedskab x Farmhand				0.00931	
				[0.0477]	
Observations	20,898	20,898	20,898	20,898	19179
R-squared	0.644	0.649	0.644	0.644	0.548

Notes: The dependent variable is the natural logarithm of the daily wage. Columns (1), (3) and (5) show the results for the non-flexible model; the variable “serfdom” represents a dummy variable which takes the value of 1 in the period in which serfdom affected workers (1733-1799); unskilled is represented by laborers, day laborers and farm laborers; vornedskab is a dummy variable which takes the value of 1 during the working age of those affected by vornedskab (1717-1733); Columns (2) and (4) show the results for the flexible model: Period 1 is defined by the years 1733-1740, period 2 by 1741-1763, period 3 by 1764-1787 and period 4 by 1788-1799. All models include fixed effects for years, occupation, region, season, child, master (if craftsmen) and gender in columns (1)-(4). Jutland Funen year fixed effects are added in column 3; coefficients are reported with the robust t-statistics in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$); the standard errors are clustered at the estate level.

Table 3: Robustness to sample

	Dependent variable							
	Log wage							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Serfdom x farmhands	-0.124	-0.349**	-0.350**	-0.351**	-0.300**	-0.345**	-0.316**	-0.351**
	[-0.735]	[-2.187]	[-2.397]	[-2.322]	[-2.527]	[-2.153]	[-2.26]	[-2.33]
Occupations excluded	All	All	All	All	Teachers	Carpenter	Farm servants	Masons
Time period	1705-1741	1705-1763	1705-1787	Full	Full	Full	Full	Full
Observations	731	5,592	16,288	20,927	20,492	19,738	19,585	20,482
R-squared	0.76	0.679	0.655	0.644	0.652	0.652	0.64	0.641
Controls for								
Occupation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Season	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Child	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Master	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the natural logarithm of the daily wage. Serfdom represents a dummy variable which takes the value of 1 in the period in which serfdom affected workers (1733-1788); unskilled is represented by laborers, day laborers and farm laborers; the analysis is conducted for the period 1705-1741; Yes and No indicate if a control variable is included in the specification; coefficients are reported with the robust t-statistics in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$); the standard errors are clustered at the estate level.