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Abstract

Granular microdata is of growing interest within economics and economic history. Thus, we document, present, and make available to the scholarly community a uniquely detailed database of 20,152 observations of wages and 30,000 observations of prices in rural Denmark for men, women and children, and for both skilled and unskilled workers over the eighteenth century. We the proceed to illustrate two potential applications. First, we construct nominal wages and deflate them using Allen's constant consumer baskets. Real wages exhibit a considerable fall with the introduction of serfdom, and other changes consistent with known historical events. Second, we consider skill premia, finding no secular trends between skill categories, but considerable variation both within and between categories over time, suggesting that estimates based on simple averages should be interpreted with caution.

JEL Codes: J31, N33, N93

Keywords: Denmark, microdata, prices, skill premia, wages

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1. Introduction

Sometimes, large quantities of historical data are collected, but their value is not immediately apparent. They might then disappear, or, fortunately, they are rediscovered when their value is recognized. Thus, at a time when largescale individual-level data are de rigueur for an increasing number of studies in economic history, the principle aim of the present work is to introduce, document and make available to the scholarly community such a source: namely, a uniquely rich microlevel dataset on wages and prices for the periods 1661-1669 and 1705-1805 for rural Denmark[3]. We then also suggest some applications. These data cover a particularly eventful yet somewhat understudied period of Danish history. For most of the seventeenth century, Denmark had been at war with Sweden; the state transitioned to an absolutist monarchy in 1660, but the ideas of the Enlightenment and related reforms manifested themselves around the end of the period.

The data were originally collected by the Danish Price History Project, which ran from 1939 to 2004 at the University of Copenhagen, although, unlike for the prices, the information on wages they found has been almost entirely unexploited and undocumented.[4] This includes wages for a variety of occupations, for 17 manors and two households, resulting in a total of 20,152 observations. For prices, there are more than 30,000 observations, collected from the same locations as the wages, and we refer for this to the detailed description provided by Andersen and Pedersen (2004). We use these to construct local price indices, allowing us to produce a series of real wages.[5] We also use the wages to investigate skill premia over time as an illustration of the possibilities opened up by such data: we can provide information not only over time but also between and within various different skill categories.

The early period covers that of the Great Northern War in which Denmark actively took part in 1700 and from 1709 to 1720. This was followed by the reintroduction of "the Danish equivalent of serfdom", or adscription, in 1733 – the first time it had applied to the whole country, although the eastern islands had experienced a form of serfdom called "*vornedskab*" which was gradually abolished from 1702. Adscription aimed to tie male farmhands to the estate in the area in which they were born for males of increasingly wide age ranges – 4-40 years by 1764 – but this was relaxed in 1788 and it was abolished in 1800 (Jensen et al 2018). Thus, according to Andersen and Pedersen (2004, p. 90), seventeenth- and eighteenth-century agricultural labor markets involved an unequal bargaining process between landowners and workers, and it would be too risky to speak of a labor market in the modern sense. Recently, Lampe and Sharp (2018) have

[3] Our focus here is on the "Kingdom of Denmark" or Denmark proper, which does not include other territories of the Danish monarchy, such as Norway and the Duchies of Schleswig and Holstein.

[4] See Andersen and Pedersen 2004 (in collaboration with Mette Ehlers), who mention the wage data, and provide some discussion of them, but otherwise mostly focus on the prices.

[5] Clearly, one might question the representativeness or the appropriateness of the price series for constructing real wages. However, the Danish Price History has the advantage that the prices are provided at the level of the manor, which allows for the construction of regional CPIs.

demonstrated that the eighteenth century and the arrival of enlightened elites marked a defining moment in Danish history, laying the grounds for the rapid development the country was to witness in the following century (see also Jensen et al 2019). The data thus cover a period which is crucial for understanding the process behind Denmark becoming the rich and successful country it is today.

Beyond the uniqueness of the data, why might we be interested in studying wages in Denmark in the eighteenth century? The answer is at least twofold. First, a growing body of literature focuses on constructing and analyzing wage series for different countries for the distant past. Such endeavors were revitalized by the work of Allen, who presented real wages for unskilled and skilled workers for up to 20 European cities, by making use of archival data from the fourteenth century to the First World War. Allen (2001) found a divergence in Europe between 1500 and 1800, as wages fell in most parts of Europe, but were maintained in the North Sea region, namely in England and the Low Countries – the so-called Little Divergence. The debate on this is ongoing, with new data from historical national accounts, real wages and other indicators[6] for various countries. Another notable contribution was that of Clark (2005), on whose methodology we also draw, and who used existing data for England to obtain a long series from 1209 to 1914, and calculated skill premiums. Then, more recent work for England by Humphries and Weisdorf (2015, 2019), Horrell and Humphries (2019) and Horrell et al (2020) has made major contributions by drawing attention to families including women and children, as well as annual workers.[7] Outside England, recent contributions include Ridolfi (2019), who collected data for French workers for the period 1250–1860.[8]

Detailed data for the case of Denmark have been missing from the international evidence so far, since only aggregate wage data, relying on secondary sources, have been constructed. Khaustova and Sharp (2015) constructed long series for urban and rural wages in Denmark using various published sources covering the period 1731-1913. Their series for rural wages begins in the 1790s, which marks the end point of the data considered here. Similarly, Abildgren (2017) combined published aggregate wage data for Denmark (mostly for Copenhagen) to construct a series from the 1500 to 1820. None of these studies had access to micro level data, although Gary (2018) has similar data for Scania in Sweden, but mainly for urban workers.

Another reason for the importance of these data is that we have very limited knowledge of Danish

[6] Indicators, such as urbanization, book consumption, literacy rates and human capital have been used to show that indeed, there was economic progress in England and the Low Countries as opposed to the situation in the countries from Eastern and Southern Europe (de Pleijt and van Zanden 2016); Dall Schmidt et al. (2018) show that Denmark was experiencing increased urban populations from at least the 1840s.

[7] There are also other important studies of Britain. Humphries and Schneider (2019) present wage data for spinners and use this to engage in the debate about why Britain industrialized. Stephenson (2018) presents new evidence from the construction sites that supplied the underlying wage data existing for London, and uncovers the contractual and organizational context in which they were recorded, and conclude that wages were actually below current estimates.

[8] Data also exist for other parts of Europe: for Poland (see Malinowski, 2016); for Italy see Rota and Weisdorf (2019, 2020).

economic development before 1800, as GDP per capita data are missing,[9] and real wages have only been constructed for parts of the country. Most importantly, no previous study on eighteenth century living standards and skill premia has been able to exploit data anywhere near as rich as those we have at our disposal from Denmark. To rectify this, we proceed as follows. The following section provides a description of the data and how the dataset was constructed, Section 3 presents some real wage calculations, and Section 4 provides an analysis of skill premia. Section 4 concludes with suggestions as to how the data might be used in the future.

2. Data description and building the dataset

As noted above, the dataset on wages we have constructed is based on impressive work by the Danish Price History Project. A full description of the variables in the database is provided in the data appendix (Table A1), while the sources are provided by Andersen and Pedersen (2004). Curiously, despite the wealth of information they provide about the prices they collected, they only provide a brief discussion of the wages, which have otherwise remained largely forgotten in a number of old data files, which we were provided by former members of the Price History project. Making the data useable was a significant challenge, but we cleaned the data and classified the occupations according to HISCO and HISCLASS. The resulting dataset consists of 20,152 observations of wages for men, women and children, for a variety of occupations. In our application below, we will focus on men as most of the data is from this group, though we acknowledge that much of the recent work has shown that women and children were of course also important participants in the labor market. In the following, we first provide a description of some of the main features of the data, and then explain how we constructed the database.

Description and features of the data

The seventeen manors are spread across the three main parts of Denmark: Zealand, the eastern island on which Copenhagen is situated; Funen, the central island; and Jutland, the peninsula in the west. Most of the manors are located on Zealand, but the data contain observations over the whole period for all three regions. The data included in the Price History Project were chosen from the manors with a great level of preservation and accessibility. However, the distribution of the manors is relatively proportional with the population distribution, with more manors available for the areas in which the population density was larger. Thus, it can be argued that there is good coverage of the whole country. The island of Zealand, which housed most of the population, had the most manors: Giesegaard, Bregentved, Gisselfeld, Herlufsholm, Holsteinborg, Fuirendal,

[9] Hansen (1984) provides estimates of national income, but only starts in 1818, and the data have several drawbacks. However, a group of researchers at the University of Southern Denmark is currently working on a project involving the development of GDP estimates before 1800, with the help of a grant received from the Danish Research Council.

Sorø Akademi, Lovenborg, Gaunø, and Juellinge. The island of Funen is represented by Tåsinge, Frederiksgave, and Erholm-Søndergaarde. Finally, Jutland is represented by the following manors and a household: Frijsenborg, Støvringgard, Lindenborg, and Odden. A more complete description is provided by Andersen and Pedersen (2004). Besides the wages, the data also contain other detailed information: i) payment in kind; ii) gender and marital status, as well as an indication of whether they were a child; iii) number of days worked and season; iv) name; and v) Worker's residence and distance to their work.

i. Payment in kind and annual vs casual workers: The data contain observations on both casual workers and long-term workers, and thus enable a comparison between the wages of the two categories. 27.2 percent of the observations belonged to longer term workers. These tended to be medium- and higher- skilled people working on the manor, while the others were unskilled and lower-skilled, employed mainly in agriculture and construction. For some occupations, such as bricklayers and carpenters, the records show that both forms of employment were common and that casual workers doing the same job tended to earn more than the others, but this does not provide the whole picture. One difference between the two categories is that 7.36 percent of longer-term workers also received other benefits besides their salary. For example, some servants received allowances for buying sugar and tea, gamekeepers received extra money for buying boots and weapons, administrators received money for buying writing materials and various other manor officials also received money for buying goods important for their work, such as clothes and candles, or for keeping their own horses. Another difference between the two categories of workers is how often they received payments in kind. The data show that nearly 20 percent of long-term workers received some form of payment in kind, as opposed to just one percent of the casual workers. In most cases, the employees were given grains, especially rye and barley, but also oats and flour, while only one employee, who received part of a cow, breaks this pattern. The Danish price history has noted down the value of these goods and our calculations show that, on average, the payment in kind was worth 47.7 percent of the total value of the salary. But this amount varies significantly, with extreme examples, such as a stable worker who received 99 percent of his pay in rye and barley and a doorkeeper who received 83 percent of his pay in kind. At the other end of the spectrum lie the well-paid workers, such as a farm administrator for whom the payment in kind amounted to only 2 percent.

ii. Gender and married/unmarried women's work: It is interesting to note that the data, besides noting gender, also enable us to establish the marital status of most of the women for whom wage observations are available. Specifically, in the denominations of occupations, it is stated in Danish: "*pige*" (girl) and "*kone*" (woman, often older and thus usually married). Many times, it is also noted whose wife or daughter the individual was. We find that 65 percent of the observations are for unmarried women, while only 11 percent were married. The rest could not be classified. One interpretation could be that this distribution, with fewer married women

working on the manor, suggests that women had an incentive to delay marriage in order to be able to work and earn more money before starting up a household, which is one of the features of the European marriage pattern (Hajnal 1965).

iii. Number of days worked and season: The number of days worked is also an important characteristic of this dataset. It consists of 331,614 workdays, and in addition to this, the length of employment is mentioned for 436 of the records. This means that the month and day in which employees started and finished working is listed. This allows for the calculation of the number of days per week an individual worked, something much sought after in the literature. These later datapoints are from 13 of the manors, spread across Denmark, and cover most of the century for a range of occupations. The month and season in which they worked is also listed.

iv. Name matching: The dataset offers another valuable detail: the workers' first and last names are listed for some of the observations. By allowing us to trace names, this is an interesting source for revealing how long a person worked for a manor on average and how the worker's salaries changed. To trace a person, we look for those workers whose name shows up at least twice in the records of a manor and who did similar jobs in all the observations. On average, the time between the first and the last observations for one person is a little over 10 years. Because most of the individuals we could track were casual workers, they only worked on the estate for an average of 100 days in this 10-year period.[10] A master mason is the person who could be tracked over the longest period of time, with 44 years between the first and last observations. As a craftsman was usually around 20 years of age when he could get the title of master, this man probably worked well into his sixties. By looking at the evolution of an individual's salaries, it can be observed that the nominal value tends to increase over time, but there is greater rigidity in the wages of full-time employees.

v. Worker's residence and distance to their work: The data also allow us to make observations on the mobility of workers. Some of the manors had data about the residence of their workers and also where they worked, if this was not on the estate. We observe that the majority of the employees lived in the vicinity of the manor, which is not surprising given the impact of adscription, and the fact that the slow means of transportation of the era meant that workers had little incentive to take a job that was not close to their home, as they would have to pay the cost of transportation and board and lodging close to their workplace. We should note, though, that these data do not give any information about migration to or from a region in search of a better job.

[10] They could also have worked at home for the rest of the time.

Building the dataset

To build the dataset, the first step was to organize it by coding the occupational titles and tasks according to HISCO (Historical International Standard of Classification of Occupations) and HISCLASS (Historical international social class scheme). The HISCO system was developed by Marco et al (2002) in order to facilitate comparisons between historical occupations and contains 1,881 of such occupation titles from countries around the world from the sixteenth to the twentieth centuries[11]. HISCLASS was created by van Leeuwen and Maas (2011) to facilitate an evaluation of the skill content of these occupations and to frame them into fewer categories. Each occupation was assessed and assigned by experts based on the Dictionary of Occupational Titles (DOT) system, into one of the following four levels of skills: unskilled, lower-skilled, medium-skilled and higher-skilled according to the competencies required for an average worker.

Additionally, the data were checked for outliers. For example, in some cases the wages of craftsmen are very high because they include the wages of assistants. However, not knowing exactly how many helpers these individuals had and how the wage was divided between the master and his assistants meant that these observations had to be discarded. Another example is the case of teachers, who, in many cases, only received part of their salary from the manor. This meant that many teachers appear to have salaries at the same level as unskilled laborers, and thus these observations also had to be ignored.

Using the system described above, the data can be classified into more than 80 occupations. HISCO codes could not be assigned for seven of the occupations/tasks, and these amounts refer to, for example money for donations, school allowances, pensioners or amounts inherited. Table A2 in the appendix shows the HISCO occupations distributed according to the HISCLASS scheme. If such a classification system had not been used, simply dividing the data into skilled and unskilled labor would be difficult. The reason is that each occupation requires a certain set of skills and education to be able to complete the tasks. The housekeeper and the teacher provide an illustrative example. Both occupations can be considered suitable for the skilled category, but the skills needed for the jobs are very different.

Figure A1 in the appendix plots the number of observations for all workers (men, women and children) distributed according to HISCLASS into unskilled, lower-skilled, medium-skilled and higher-skilled (see de Pleijt and Weisdorf 2017). For the period considered, the observations belonging to the unskilled and lower-skilled groups represent about 70 percent of total observations.[12] The rest are divided between medium-skilled and higher-skilled, the latter category representing just 5 percent of the total observations. A few

[11] It is an historical extension of the ISCO (International Standard Classification of Occupations) and has been used extensively in historical studies as well as those similar to the present work, see for example Humphries and Weisdorf (2015).

[12] The workers that would classify as skilled (either medium or high) would presumably be independent masters and their services could then potentially be found in the accounts as goods instead of as wages. The price-material only follows a fixed number of goods, but other goods that were bought during the period did not occur frequently enough to be included in the project.

examples of highly skilled workers are head teachers, surgeons, judges, priests and surveyors. Stonemasons, carpenters, brewers and butchers are a few examples of medium-skilled jobs, while fishermen, painters, and thatchers are examples of lower-skilled workers. The main unskilled occupations were laborers, day laborers, farm laborers and farm servants. In the medium-skilled category, the largest number of observations belongs to stonemasons and carpenters, while for lower-skilled jobs the most common are painters. In the unskilled category the laborers and day laborers represent the largest number of the observations. The tasks of laborers were usually digging ditches, carrying and assembling stones, working in the stable and loading timber. The farm laborers had slightly different tasks, such as, for example, working the fields, ploughing, harvesting, gathering hay etc. Women did, very rarely, have the same types of occupations as men. Their main occupations were however as washerwomen, domestic servants, milkmaids, seamstresses, weeding the garden etc. For children, jobs like domestic servant and milkmaid are among the most frequent.

For a more detailed classification, Table A3 presents the percentage of observations for all occupations by region and manor as well as the percentage of each class of worker and the percentage of observations of men, women and children. It shows that there are some imbalances in the distribution of occupations across manors which are caused by the different types of economic activities that each manor undertook. For example, Sorø Akademi leased out all its land, so the number of unskilled workers is only nine percent. Most observations are of tradesmen doing maintenance work on the school buildings. At the opposite end of the spectrum, we find the manor of Gisselfeld, where 52 percent of the observations are wages of laborers performing unskilled work. The most developed manors seem to be those in the region of Jutland. In this region, the percentage of female workers is the highest (15.8 percent), followed by a similar level recorded for children. An important aspect is that the medium and high-skilled jobs hold a greater proportion (41.1 percent) than in the other two regions (34.1 percent on Funen). Regarding the division by gender, men represented 82-96 percent of the workers, whereas the children engaged in working tasks represent 3-15 percent.

3. Calculating real wages for rural laborers

Our first application of the dataset is to construct a real wage series for rural laborers. This is not to diminish the importance of the micro-data as it is, but the construction of real wages presents a simple opportunity to examine the bigger picture of development and can facilitate international comparisons. This section describes the method used for constructing such a series. We first construct a series of nominal wages; we then construct a price index; and the finally we can illustrate the real wages.

Wages: For our series of nominal wages, we restrict our sample to the period after 1705 due to the lack of observations before this. One important feature of the data is that it divides the employees into two

categories: full-time employees, who were paid every six months or by the year, and temporary or casual employees (day laborers or even more skilled occupations, like craftsmen), who were paid by the day. For the annual workers there is no need to make an assumption about the number of days worked per week, but in order to compare the two categories, and thus to aggregate them, we started by computing the daily wage for each worker. To this end, we need to know the number of days worked in a week so that we can estimate the daily wages for full-time employees[13]. There are two sources from which this number can be taken. The first is from Kjærgaard (1994), in which the number of days worked per week is calculated as 5.9 days including holidays, during the eighteenth century. The second source is given in the comments that came along with the raw data. For many of the daily wage observations, these inform us about the dates between which the laborers worked, enabling the calculation of the average number of days worked per week, which also turns out to be 5.9 days. A more detailed analysis about the days worked and seasonality patterns for that time is provided by Jensen et al (2019).[14]

To obtain a representative wage value for each year out of the many observations on wages we have, we apply an OLS regression method similar to that employed by Clark (2005). Again, this is not to diminish the importance of the underlying data, but this method provides a simple way of "averaging" the thousands of individual wage entries.[15] Clark calculates day wage series for craftsmen, laborers and their assistants for the English countryside by estimating regressions which take into account all the available factors that influence wages. Having as a base equation the regression in Clark (2005), we added a few modifications and get equation (1):

$$\ln(W_{it}) = \alpha + \tau \ln(days_{it}) + \sum_j \theta_j occupation_j + \sum_t \delta_t year_t + \sum_{k=1}^{2} \theta_k season_{it}^k + \sum_{l=1}^{2} \mu_l region_i^l + \varepsilon_{it} \quad (1)$$

where: $\alpha =$ intercept; $\ln(days_{it})$ = period of time worked; $occupation_j$= occupation dummy; $year_{it} =$ year dummy; $season_{it}^k$ = season dummy (winter, summer, and no season); $region_i^l =$ region dummy (Funen, Zealand, Jutland); $\varepsilon_{it} =$ error term. The subscript *i* represents an individual who is observed in year t. [16] We apply weights, which match the distribution of seasons across the entire sample, though we note that this matters little for the results. The control for the period of time worked (days worked) comes from the

[13] As the number of days worked per week multiplied by the number of weeks per month and the number of months worked.
[14] Some observations are for several workers, who receive the same wage. These workers have been treated as one observation.
[15] In Figure A2 in the appendix, we compare our findings with that from a simple average, with little obvious difference, except that the wages based on the regression method are less volatile.
[16] We do not follow Clark in using the joint wages indicator variable and the interaction term between dummies for 50-year periods and region. The former is not necessary because in our case there are separate observations for the craftsmen and their laborers' wages. As a robustness check, we nevertheless also introduced the interaction term, by decades in this case, but we find no statistically significant effects, most likely because the data span a much shorter period than the one presented in his paper.

fact that the day rates may differ from the rates a worker received when employed full-time. So, the representative wage comes from the prediction in equation (1). While Clark had more observations for his estimation, we note that it covered hundreds of years, whereas we only cover about a century. In Clark's case, had data with different types of craftsmen, and as we have different occupations, our setup resembles his. Similarly, he had data for five regions and we have for three, and for a country that is likely more homogenous than England. In any case, we can also calculate the nominal wage as a simple average per year, but as we find that the regression based method gives more stable, yet similar, results, we prefer this method.

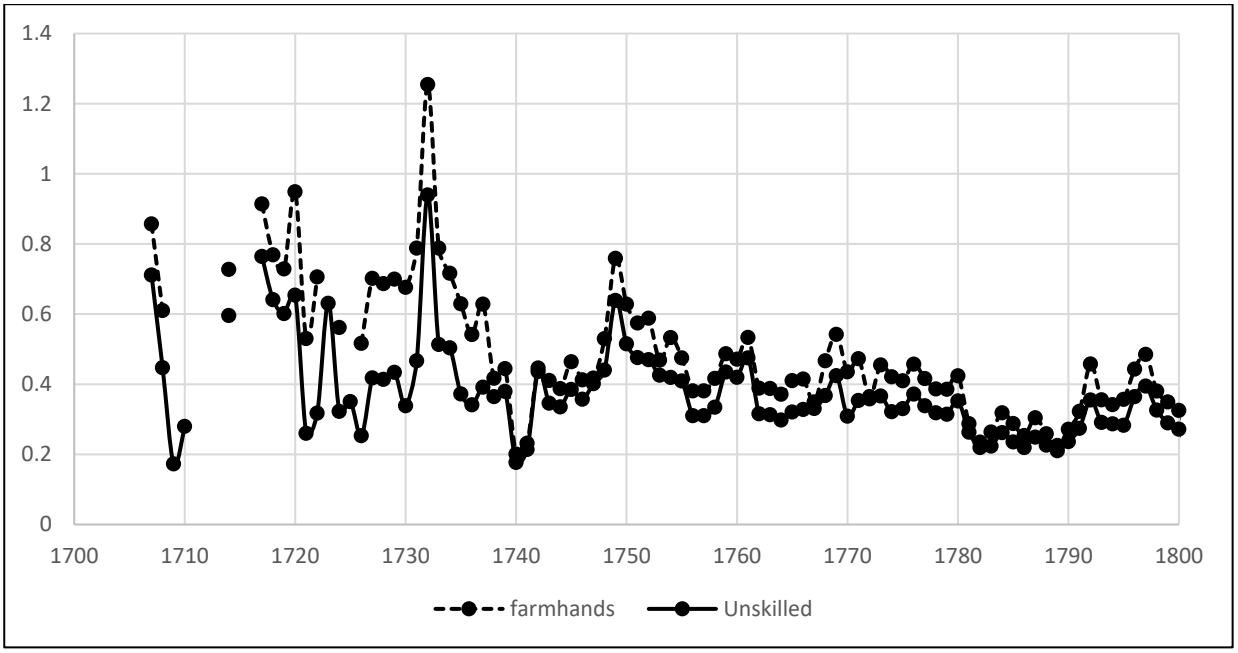
Prices: Next, we deal with the question of how to calculate a representative price level for each year from more than 30,000 observations on prices. We follow the well-known methodology of Allen (2009), in which welfare ratios are calculated by dividing the nominal wage by the price of a basket of goods necessary for the subsistence of a family (see Table A4).[17] The welfare ratio represents average annual earnings divided by the cost of a poverty line consumption bundle for a family (two adults and two children, where each child counts for 50 percent of an adult's consumption). A welfare ratio greater than one indicates an income above the poverty line, while a ratio less than one means that the family is in poverty.

The real wage series: Figure 1 presents the real wages based on unskilled farmhands and all unskilled workers.[18] The data use only adult men. We note that the real wages are very volatile up until the 1750s, and we have therefore produced a version of the graph with confidence bands, which is included in Figure A3 in the online appendix. Wages during the period of the Great Northern War show relatively high volatility. After the end of the war, a period of increasing wages followed, characterized by the migration of people from small farms to cities, where small-scale industrialization began to take hold. At the beginning of the 1730s an agricultural crisis took place, caused by low demand for Danish agricultural exports and a high cost of labor. This led to the introduction of serfdom in 1733, which is followed by a decline in the wages of unskilled labor. The wages continue to decrease during the 1740s as the manors faced an ecological crisis and cattle plague (Kjærgaard 1994). The deflation of this period makes the spikes in wages during the agricultural crisis very noticeable. The drop in real wages is also more visible after 1733, as wages were lower, and prices started to increase again. We note that for almost the entire period the welfare ratio is below one. This implies that a man was not able to provide for his family, so the wife and children would have had to have worked if they were to be able to survive. This of course makes it even more urgent to investigate the real wages of women and children in future work. In fact, real wages even dropped below 0.3 or 0.4 at times suggesting that men could not support themselves.

[17] An issue with this is that these baskets are constructed with urban consumers in mind. We choose however to abstract from this issue for the sake of comparability with other work.

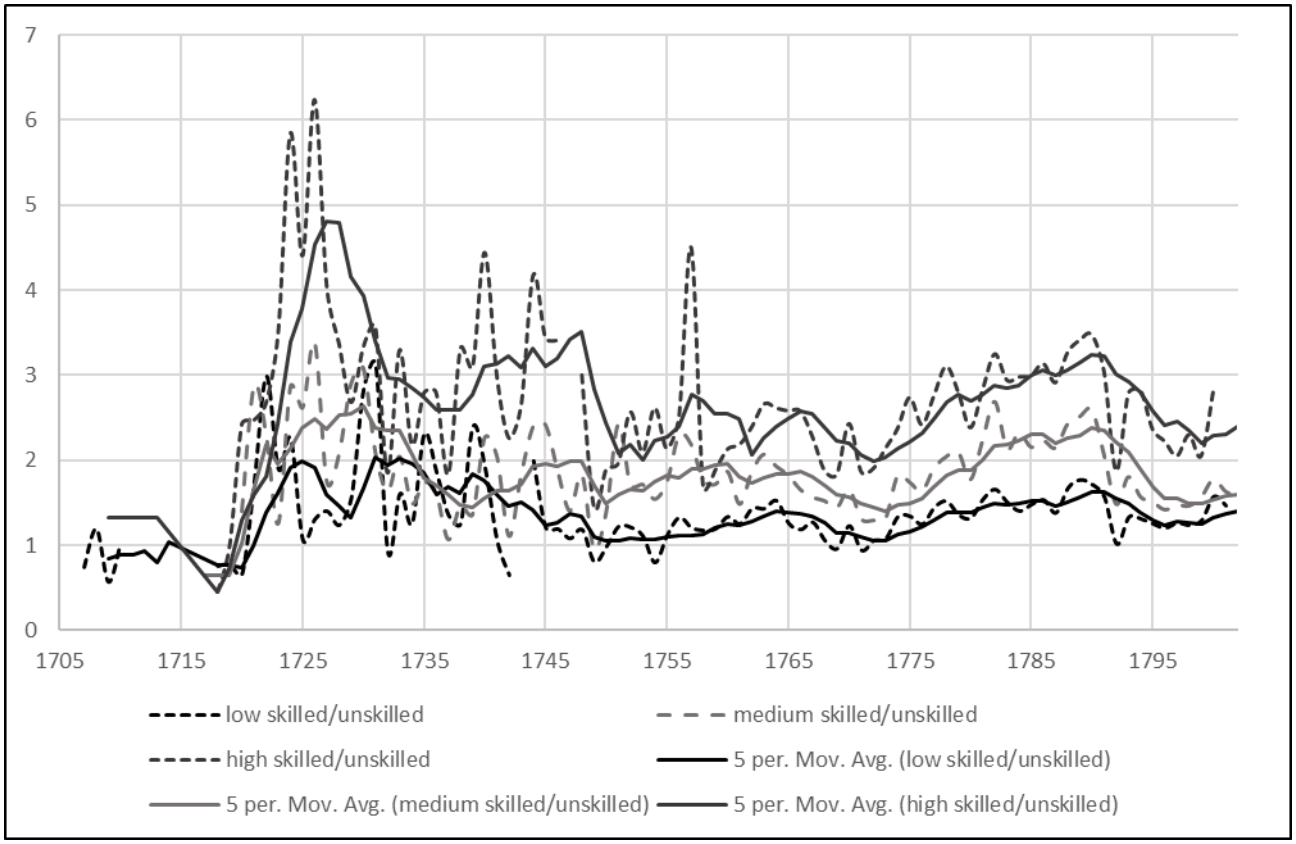
18 We only have 4 observations after 1802, so we do not use those observations.

Figure 1: Welfare Ratios for farmhands and unskilled workers



Source: Authors' calculations, see explanation in text.

Figure 2. Skill premia for men by HISCLASS for unskilled, low-skilled, medium-skilled and higher-skilled workers with 5 year moving averages, 1705-1805



Source: Authors' calculations.

4. Skill Premia

Clearly, the wealth of detail in the dataset provides a number of possibilities beyond the calculation of average wages, as briefly touched on above. Specifically, here we demonstrate how the data allow us to zoom into the various skill levels, and track the evolution of the real wage series for each HISCLASS category, as presented in Figure 2.

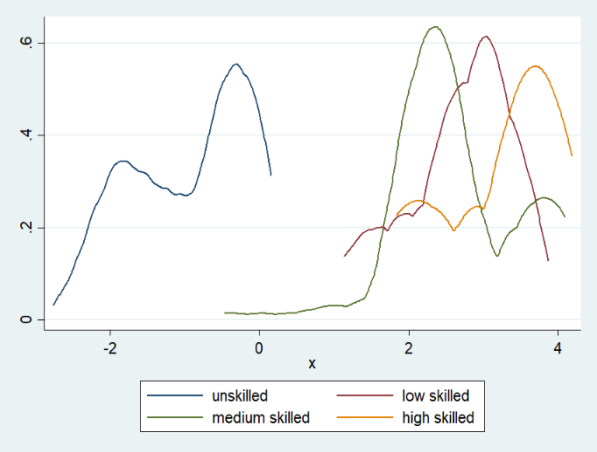
We compare to the average of unskilled workers as our baseline. The skill premia are very volatile until the 1760s, consistent with the history of war, serfdom and agricultural crises mentioned above. To aid visibility, we have calculated moving averages, but we note that some of the fluctuations are caused by the data being thinner. We observe that the salaries of unskilled workers were often similar to those of lower-skilled employees. Lower-skilled occupations included jobs like gardener, stone cutter and paver which were jobs that were also could also be done by unskilled workers, such as day laborers. Despite the volatility of the data, we observe quite high skill premia for high and medium skilled workers in the whole data period, although the very high skill levels in the 1720s should probably be interpreted with caution. From the 1760s, there is a positive relationship between the skill premium and the skill level. High skilled jobs have the highest average skill premium in all years, but after initial declines, from the 1770s to the early 1790s, the skill premia for the three categories increases after which they reach a plateau at the end of the century. Serfdom existed in its tightest forms from 1764 (Jensen et al., 2018), and since this institution aimed to keep unskilled farmhands in the countryside, it may have prevented movement into higher skilled occupations.

To gain further insights on the skill premia, we computed real wage distributions for different decades, see Figure 3. We observe that there is a substantial separation between the wages paid to unskilled workers and those with higher skilled workers. The three higher skilled categories have substantial overlap between their distributions in all four periods. In the 1750s and 1770s, where we have more data, the highest earners in the unskilled category also have some overlap with the with lower tails of the wages of those with higher skills. We also observe that there is a lot of variation in how much is earned in the different categories: an important point to bear in mind when observing the averages.[19]

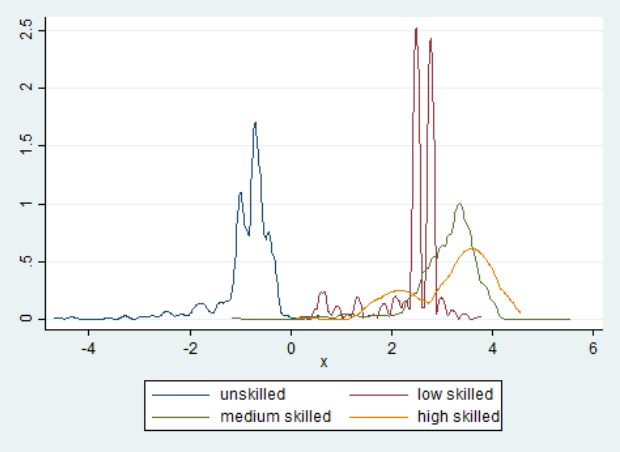
[19] Alternatively, this could suggest some imperfections in the HISCLASS system, but that fact that the distributions of the high skilled usually have more support to the left than the low skilled makes us reluctant to make that conclusion.

Figure 3: Kernel density estimate of the real wage distribution, 1731-1800

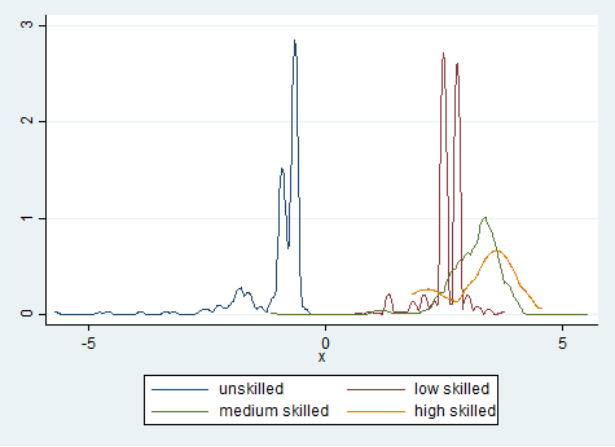
(a) 1731-1740



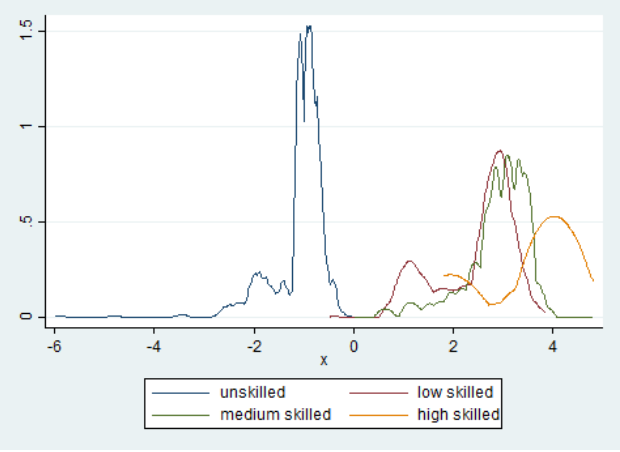
(b) 1751-1760



(c) 1771-80



(d) 1791-1800



Source: Own calculations.

For the period 1830-1913 Khaustova and Sharp (2015) find skill premia between masons and laborers in Copenhagen to be falling steadily over that period from 273 percent to 147 percent. Since masons are classified as medium skilled, we can compare this to the simple averages in Figure 2, where we observe fluctuations around similar levels, but no obvious secular trend. Thus, as concluded by Khaustova and Sharp, our findings are large compared to those found for England by Clark (2005), at around 150 percent for this entire period), and much larger than those found by van Zanden (2009), of around 50 percent for Western Europe and between 60 and 140 percent for Central and Southern Europe. However, the variation in the

wages revealed by Figure 3 means that such findings should be taken with a pinch of salt, and the actual wage differentials could vary considerably between and within various skill levels.

5. Conclusions

We have presented a new database of micro-level data on wages collected by the Danish Price History Project. The result is a repeated cross-sectional database for Danish workers in 19 different manors and households in the Kingdom of Denmark and comprising 20,152 observations on wages (and more than 30,000 on prices). These data are unusually detailed, containing information on wages for a variety of occupations, for males/females, children/adults, apprentices/masters, skilled/unskilled workers.

The aim of this paper was to document the data and introduce them to the scholarly community. We can imagine several applications of the new database, beyond the obvious comparisons that can be made by constructing real wage series and the first attempt at looking at skill premia described above. Specifically, the micro-level nature of the data would permit for example a detailed investigation of the impact of the institution of serfdom for agrarian labor markets. Many authors believe that serfdom prevented the development of modern labor markets in which individuals themselves choose where to work and live, and thereby the move towards a modern capitalist economy. It would for example be possible to test whether there were any effects of serfdom on relative wages, and some preliminary work is given by Jensen et al (2018). We have also begun looking for evidence of an "industrious revolution" or an increase in the number of days worked over this period, and have combined the data with other sources to test for the presence of Malthusian mechanisms in the Danish countryside. Finally, other work based on this data might be imagined, for example on: regional wage convergence; women's participation and gender gaps, children's work; or a wealth of other possibilities that might result from having the names and skill levels of the workers.

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Appendix – for online publication only

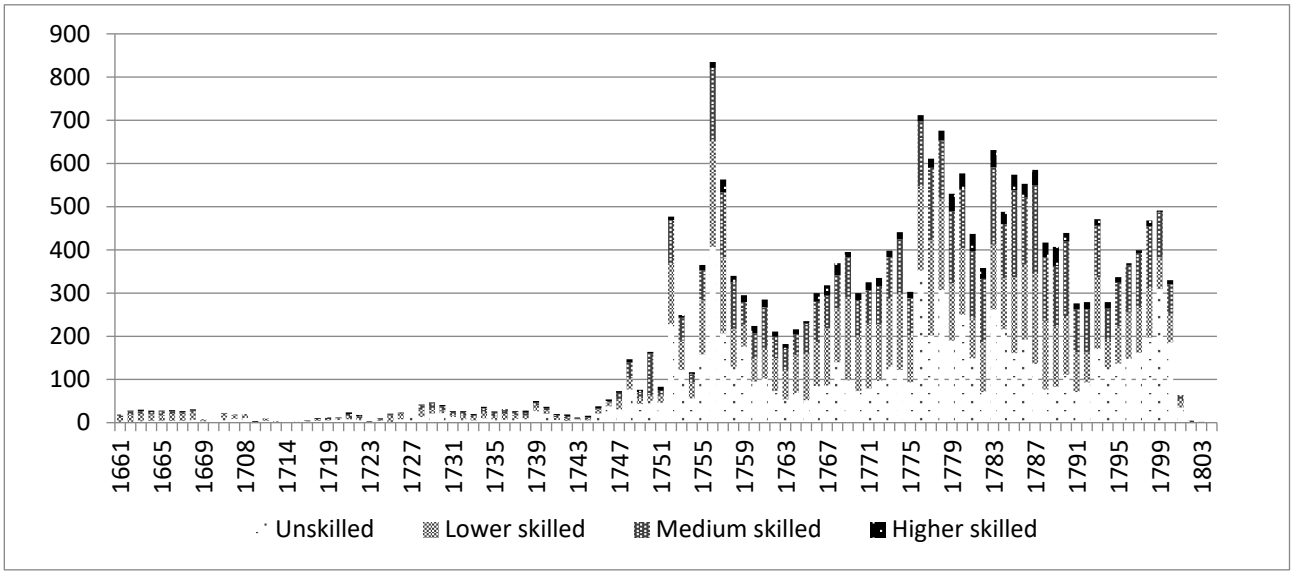

Figure A1. Number of observations divided by HISCLASS: higher-skilled, medium-skilled, lower-skilled and unskilled workers (men, women and children).

Source: Own calculations.

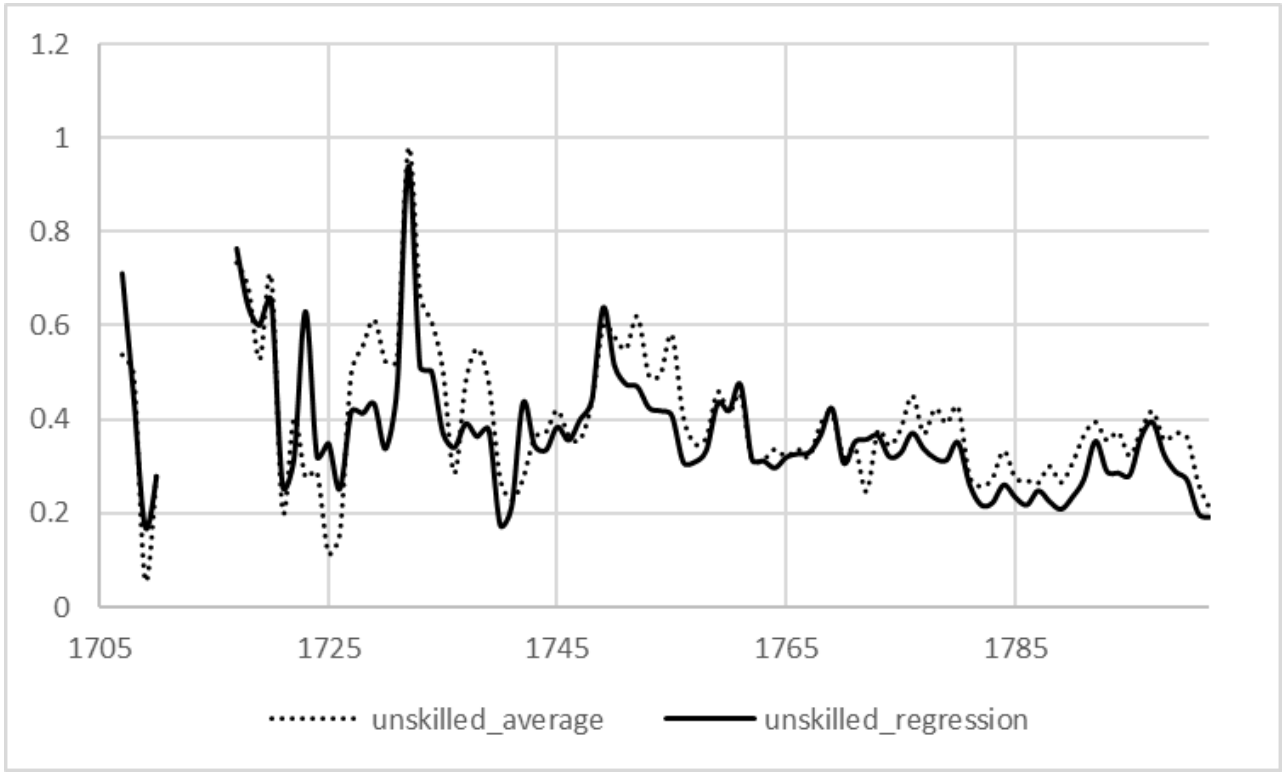

Figure A2. Comparison of Real Wages Calculated Using the Regression Method and Simple Averages

Source: Own calculations.

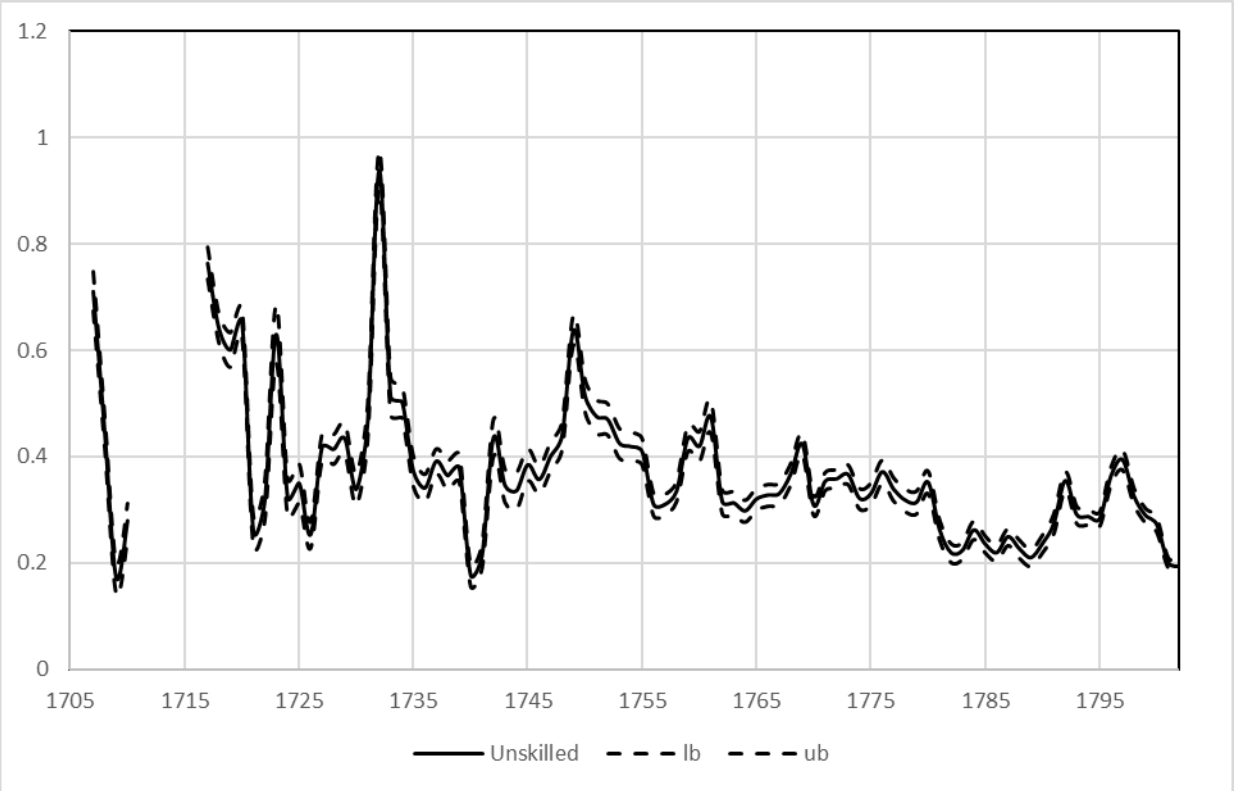

Figure A3. Wages of Unskilled Workers with 95% Confidence Bands, 1705-1802

Source: Own calculations.

Table A1: Description of the variables in the database

Variable name	Variable description
manor name	name of manor were the data was recorded
region	name of region were the manors or estates were situated
year1	year when the work was carried out
year2	given for longer periods, the year when the work was finished
gender	gender of the worker as given in the manor records
type	type of employment as given in the manors' records (full time workers or casual workers)
function/occupation	occupation of the worker in Danish
mester/svend	contains information on whether the workers were apprentices or master craftsmen
child	indicates whether the worker was a child
OccupationEN	occupation of the worker in English
HISCO	classification of occupations according to the Historical International Standard of Classification of Occupations
norm wage rate	day wage for all workers which in the case of full-time workers is calculated by dividing the annual wage to the number of days worked
norm days	Number of days worked which in the case of fulltime workers is estimated from the number of months they were employed
season	the season in which the work was carried out (taken from the comments)
month/season	the month/ season in which the work was carried out (taken from the comments and written in the accounts)
wage period	number of months worked by a full-time employee
total wage	the total wage received by a full-time employee in the given period
wage rate	day wage given in the case of casual workers
days	number of days worked by the casual workers
food/own food	the value of the food received by workers from the manors as payment in kind
materials	the value of the items received from the manor necessary for the worker's job
Food	the type of food received as payment in kind
Kost	if the workers received food and board from the manor (i) or at their own expense (e)
Kone/Pige	marital status of women if known (from names or comments)
names	the names of the workers
residence	the residence of the workers
workplace	town were work was conducted if it was carried out outside of the manor’s grounds and noted in the data
Start Day	day of start of employment
Start Month	month of start of employment
End Day	day of end of employment
End Month	month of end of employment
Period length	number of days between start date and end date of employment
comments	comments written by the Danish Price History Project
other comments	second comment field written by the Danish Price History Project
archive	manorial archive from which the entry was taken from

Table A2: A description of the occupations in the data

HISCLASS classification	HISCO classification
Unskilled	Laborer, day laborer, demolition worker, charcoal burner, logger, livestock worker, agricultural laborer, farm servant, subsistence farmer, doorkeeper, watchman, chimney sweep, bell ringer
Low-skilled	Coachmen, wine bottler, builder, paviour, basket maker, painter, brick and tile moulder (hand), stone cutter, wheelwright, net maker, weaver, stone splitter, fisherman, forester, gardener, dairy, servant at home, correspondence clerk, messenger, postman, barn bailiff
Medium-skilled	Glazier, plasterer (general), wood shipwright, joiner, carpenter, stonemason, bricklayer, potter, watchmaker, smith, cooper, saddler, shoemaker, seamstress, brewer, butcher, grain miller, spinner, nurse, gamekeeper, forest supervisor, policeman, cook, merchant, housekeeper, inspector, organist, deacon
High-skilled	Surgeon, doctor, tax assessor, land surveyor, farm supervisor, minister of religion, head teacher, teacher, notary, government administrator

Table A3: Distribution of occupations by category

Regions and estates	%				%		
	Unskilled	**Lower skilled**	**Medium skilled**	**Higher skilled**	**Women**	**Men**	**Children**
Zealand	**37.1**	**34.0**	**24.7**	**4.2**	**3.7**	**96.3**	**2.7**
Bregentved (1746-1800)	38.6	1.8	59.6	0.0	0.6	99.4	0.7
Fuirendal (1756-1795)	20.0	43.9	24.0	12.1	18.4	81.6	14.1
Gauno (1751-1800)	22.6	34.1	31.8	11.6	2.2	97.8	3.2
Giesegaard (1721-1800)	40.1	39.7	19.0	1.1	0.2	99.8	0.2
Gisselfeld Household (1706 1740)	52.4	30.9	16.7	0.0	25.6	74.4	6.6
Herlufsholm (1661-1728)	14.5	56.4	20.7	8.4	13.2	86.8	22.0
Holsteinborg (1748-1800)	43.6	30.4	25.6	0.4	5.0	95.0	0.8
Juellinge (1726-1748)	33.8	45.6	20.6	0.0	0.0	100.0	0.0
Løvenborg (1752-1794)	42.7	34.5	19.4	3.4	0.7	99.3	0.6
Sorø Academy (1740-1800)	9.4	56.2	33.7	0.6	0.0	100.0	0.0
Funen	**43.1**	**22.8**	**30.1**	**4.0**	**14.4**	**85.6**	**10.1**
Erholm Søndergade (1723-1800)	55.6	15.6	28.8	0.0	8.2	91.8	0.6
Frederiksgade 1773-1800	64.8	18.6	16.4	0.2	21.0	79.0	13.6
Taasinge (1725-1800)	26.7	27.1	39.1	7.2	11.5	88.5	9.9
Jutland	**27.2**	**31.7**	**30.9**	**10.2**	**15.8**	**84.2**	**14.9**
Frijsenborg (1777-1800)	23.5	28.7	36.9	10.9	9.2	90.8	11.4
Lindenborg (1714-1799)	26.1	42.5	27.5	3.9	23.1	76.9	24.9
Odden (1703-1732)	34.8	21.2	19.7	24.2	0.0	100.0	0.0
Støvringgard (and household) (1734-1800)	34.9	18.3	27.8	19.0	15.7	84.3	4.3
Total	**37.1**	**30.8**	**27.1**	**5.0**	**8.4**	**91.6**	**6.5**

Table A4: The contents of Allen's subsistence consumption basket

	Subsistence
Bread	155 kg
Beans/peas	20 kg
Meat	5 kg
Butter	3 kg
Cheese	-
Eggs	-
Beer	-
Soap	1.3 kg
Cotton	3 m
Candles	1.3 kg
Lamp oil	1.3 l
Fuel	2 mbtu
Rent	5% of total

Source: Allen (2009)

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