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# Lund Papers in Economic History



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No. 181, 2018

*Education and the Labour Market*

## A Workers' Revolution in Sweden?

*Exploring Economic Growth and Distributional Change  
with Detailed Data on Construction Workers' Wages,  
1831–1900*

Johan Ericsson & Jakob Molinder

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# A Workers' Revolution in Sweden?

Exploring Economic Growth and Distributional Change  
with Detailed Data on Construction Workers' Wages, 1831–1900\*

*Johan Ericsson\** and *Jakob Molinder<sup>^</sup>*

## Abstract

The impact of the transition to modern economic growth on the distribution of income is widely debated. The experience of early industrializers like Britain and the US has informed much of the debate, lending support to the idea embedded in the models of Kuznets and Lewis that real wages of laborers tend to lag behind the growth of GDP per capita in the early stages of economic development. We examine the impact growth on workers in Sweden using a new dataset on daily wages for helpers, carpenters, masons, and teamsters over the 1831–1900 period. The data has a uniquely detailed geographical coverage, including a broad set of places in the countryside as well as towns. Our new series shows that real wage growth began in the mid-1850s, that the average yearly increase was substantial and superseding GDP per capita growth after 1880, that it was larger for unskilled helpers than higher-skilled groups, and was present in the countryside and urban areas alike. A comparison with Northern Europe shows that unskilled workers in Sweden benefited to a much greater extent from economic growth, highlighting the importance of paying careful attention to distributional issues when comparing living standards across countries.

**Keywords:** wages, inequality, distribution, economic development, growth, living standards, Kuznets-curve, Lewis

**JEL-codes:** N00, N13, N33, O14, J31

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## 1. Introduction

The development of wages play a crucial role in research on long-term growth. Real wages is taken to reflect changes in the wellbeing of the working class, and the spread in earnings between workers of different skill and for similar workers across geographical areas are used as indicators of the impact of technology and institutions on the functioning of labor markets (Williamson, 1985; Allen, 2001; Zanden, 2009, chap. 5). Naturally, the availability of high quality and disaggregated wage series is, therefore, key. However, earlier attempts to measure commonly used indicators of labor market development, such as skill differentials and urban-rural wages gaps, have often been limited by the quality of the underlying data.

One area where data on wages has played a key role is the long-standing issue of the impact of early economic growth on inequality. Much of the debate has been informed by the surplus-labor and dual-economy models of Lewis (1954) and Kuznets (1955) predicting that unskilled wages remain stagnant or grow slower than average incomes as surplus labor in rural agriculture hold down incomes of laborers in the expanding urban and industrial sector. The experience of Britain and the United States, the first two countries to industrialize, has informed much of the debate, and for these countries early economic growth seem to have been associated with growing inequality, lending support to these theories (Williamson and Lindert, 2016; Allen, 2018). It remains unclear whether the experience of these countries generalize, however. The recent upsurge in research on inequality has also highlighted how comparisons of average incomes can give the wrong impression of comparative living standards for poorer segments of society (Piketty, Saez and Zucman, 2018). Since inequality in incomes peaked in most countries in the late nineteenth century, attention to these issues is likely to be important during the industrialization period as well.

In this paper, we analyze the impact of early industrialization on workers in Sweden using a new dataset on construction worker wages covering the 1831–1900 period and four groups of workers: helpers, carpenters, masons and teamsters. The data consist of reports on wage rates sent in by local fiscal authorities that was used by the state to assess the cost of construction projects and has a uniquely detailed geographical coverage, including a broad set of places on the countryside as well as a large proportion of towns. The period covered was a time of significant economic change. In this period, Sweden experienced an agrarian revolution, culminating in the 1850s, which produced an increasing number of landless workers. From around 1860, industrialization started to radically transform the economy by pulling workers out of agriculture, putting Sweden on the path to becoming one of the leading industrial economies by the First World War. Our new data series allows us to track how these significant

shifts affected worker living standards and to test for the two mechanisms underlined by Lewis and Kuznets: whether real wages remained stagnant in the face of growing average incomes and if cities pulled away from rural areas.

We find that real wages were stable prior to the 1850s but grew significantly thereafter. Between 1855 and 1900, real wages for helpers increased by 2 percent per year, outstripping income growth for semi-skilled and skilled carpenters and masons as well as the growth of GDP per capita, suggesting that workers, and especially the unskilled, were among the primary beneficiaries of Swedish industrialization. We consequently conclude that Lewis' model of economic dualism is not an apt description of the transition to modern economic growth in Sweden. Examining Kuznets' hypotheses that workers in urban settings benefit disproportionately from growth, we find, to the contrary, that urban and rural workers saw similarly strong real wage increases. Our estimate using the full sample of bailiwicks suggests an urban wage premium below 10 percent for most of the period.

To examine if the Swedish experience was unique, we then proceed by comparing real wages of unskilled workers in Sweden to those of comparable workers in the leading cities of Northern Europe using the data collected by Allen (2001). We find that by the late nineteenth century, only London had higher unskilled wages, with wages in Sweden outstripping those in Amsterdam, Antwerp and Paris. We then compare levels of real wages to GDP per capita to examine if the Swedish position can be explained by faster economic growth. We find, to the contrary, that Swedish workers had higher living standards for every level of GDP per capita, and that wages in Sweden grew much faster during the transition to modern economic growth than in the other countries. Our results highlight the importance of paying careful attention to distributional issues when comparing living standards across countries.

The rest of the paper is organized in the following way. In the next section, we discuss previous research on the link between economic growth and inequality. We start by laying out in more detail the theories of Lewis and Kuznets and continue by discussing the historical experience of Britain, the United States and Sweden. In Section 2 we present the new database, explain the hedonistic wage regression we use to adjust the sample and describe how we go about to calculate welfare ratios. We then proceed by using the new database to analyze how early industrialization affected inequality in Sweden. We start in Section 3 by examining Lewis' hypothesis by looking at the growth of real wages and compare the development of unskilled wages to the evolution GDP per capita. We then continue in Section 4 by considering Kuznets hypothesis through a comparison of wages in urban and rural areas. In Section 5 we compare

the pattern of real wages for unskilled workers in Sweden to those of the leading cities in Northern Europe. Section 6 concludes the paper with a discussion of the results.

## 1. Literature Review

### *Theories of Economic Development and Inequality*

Lewis (1954) and Kuznets (1955) both analyzed the economy in terms of a split between a traditional sector, consisting primarily of rural agriculture, and a modern capitalist sector, dominated by urban manufacturing. In these models, economic development takes off as employment expands and productivity grows in modern industries while labor shifts away from traditional agriculture, but the source of increased inequality is different in the two cases.

In Lewis' model, the traditional sector constitutes a source of unlimited supply of unskilled labor, keeping wages down in the modern sector. Inequality increases as capitalists and skilled workers reap the benefits of growing productivity. This process continues until the pool of unskilled labor ultimately runs out, and capitalists have to compete for workers by offering higher wages. In Kuznets' model, in contrast, traditional sector workers earn a subsistence wage while incomes for workers in the modern sector grows with increasing productivity. Inequality, argues Kuznets, is higher in the capitalist sector, and together with growing income differentials between the traditional and modern sector, the shift of employment towards urban manufacturing leads to rising disparities.

In the literature on economic development and distribution, the models of Lewis and Kuznets are often taken to mean the same thing, but Bleynat et al. (2017) point out that while both models predict increasing inequality at the early stages of economic development, the pattern of rising inequality is different. In Lewis' case, capitalists and skilled workers benefit while unskilled salaries are stagnant. In Kuznets' model, to the contrary, modern urban sector wages increase while traditional rural sector incomes remain stagnant. This leads to different predictions for relative income growth with economic takeoff in the two cases.

### *Inequality and Growth in Economic History*

Inspired by the work of Lewis and Kuznets, the impact of growth on economic inequality has been intensely debated in the case of Britain, and the discussion has revolved around the issue of whether workers benefitted in terms of real income growth during the industrial revolution. While the debate has been split between optimists and pessimists, there is a general agreement that it took at least until the 1830s before the working class saw significant improvement in



their living standards (Williamson, 1985). After economic growth took off sometime in the middle of the eighteenth century, the wage share of national income declined, what Robert Allen has dubbed “Engels pause” (Allen, 2009). In a recent study, Allen (2018) charts the evolution of the social structure in Britain during the industrial revolution. By rearranging the social tables used extensively in previous research, he shows that the greatest income gains in the first half of the nineteenth century were registered for the middle class and farmers while average real income of workers was stagnant.<sup>1</sup>

In the United States the existence of a similar stagnation in wages of common laborers before the civil war have been discussed extensively in different attempts to chart the evolution of real wages (Lebergott, 1960; David and Solar, 1977). Margo’s (2000) more extensive series drawn from civilians hired at army forts show a slower rise than most previous studies, and that laborers’ wages likely trailed the growth of average incomes. The movement of general inequality has been the focus of similar debates (Williamson and Lindert, 1980). In their recent book, Lindert and Williamson (2016) show that the United States started out with a more egalitarian economic system, in line with the type of society described by Alexis de Tocqueville, but that inequality was on the rise from the revolution to the civil war. They show that several underlying forces explain increasing disparities in this period. A growing North-South divide played a part, but most importantly in relation to Lewis and Kuznets, increasing skill premiums and surging urban-rural gaps were major factors.

Much of the debate on the impact of economic growth on inequality has focused on Britain and the United States as these were the first two countries to industrialize, and on whether early industrialization in these countries was biased towards the capital owners, skilled workers and the middle class. While Kuznets himself was careful in pointing out the uncertainty of the data underlying his 1955 presidential address, Britain and the United States together with Germany were the three countries on which his original theory was formulated. But, to what extent does the experience of these countries generalize? Sweden in the nineteenth century provides a good parallel to the experience of industrialization in these countries. According to the latest figures from the Maddison-project, Sweden’s GDP per capita in 1860 was around the level reached by Britain and the United States at the start of the industrial revolution (Bolt and Van Zanden, 2014). Looking at the case of Sweden, therefore, allows us test to what extent sluggish wage growth can be considered a more general phenomenon or whether this was something particular to the British and American experience.

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<sup>1</sup> Previous research using the social tables by King, Massie and Colquhoun include Lindert and Williamson (1982) and Lindert and Williamson (1983).

In the nineteenth century Sweden experienced a classic takeoff to economic growth that resulted in a shift away from agriculture and into manufacturing and services. Industrialization was predated by an agrarian revolution from which followed radical changes to the social structure on the countryside. This has often been seen as part of a process of proletarianization; the number of people without ownership of land, and as a consequence, the share of people that were dependent on wage work for their upkeep grew. Between 1830 and 1850, the number of landless households per self-owning farmer household increased by 30 percent from 0.7 to 0.9, reaching a peak in the 1850s (Myrdal and Morell, 2011). From the 1870s, economic growth took off in a major way, originating in raw-material processing activities such as sawmills and iron making. Once this transformation started, change was rapid and economic growth would soon shift to higher added activities such as metal manufactures and pulp and paper. The change away from the primary sector was rapid, between 1860 and 1900 agriculture as a share of employment dropped by 20 percentage points from 70 to 50 percent (Lobell, Schön and Krantz, 2008). Towards the later part of the century, rural to urban migration grew and urbanization increased as economic development became increasingly oriented towards cities (Nilsson, 1989; Lundh, 2006; Eriksson, 2015).

While Sweden experienced a rapid transition to modern economic growth, there is disagreement about the consequences of this process for inequality. Söderberg (1991) examined average wages for 11 sectors over the 1870 to 1950 period. He found that wage dispersion increased before the First World War. Drawing on the results of Söderberg, Morrisson (2000 p. 227) argued in his chapter of the *Handbook of Income Distribution* that: “Sweden offers a clear example of Kuznets' curve (p. 227)”. Söderberg's results are based on a comparison of average wages across sectors, and does not speak directly to the theories of either Kuznets or Lewis however. A couple of other studies also find increasing inequality. Bengtsson (2015) study the development of middle-class wages in Stockholm and compare them to rates for unskilled workers. He shows that earnings of upper secondary teachers, policemen and clerks rose relative to laborers in the 1860s and 1870s. The data is drawn from public institutions and relate only to the city of Stockholm, which might not be representative of the country as a whole. According to recent estimates, wealth inequality was also on the rise. Bengtsson et al. (2018) use a sample of probate inventories and estimates that the share of wealth held by the richest 10 percent, increased from 79 to 86 percent between 1850 and 1900. Yet, wealth was only held by a small fraction of the population at the time so inequality in asset ownership might not reflect income inequality more broadly. The study that relate most closely to the mechanisms underlined by Lewis and Kuznets is the paper by Lundh and Prado (2014) on the

urban-rural wage gap. They compare day wages in agriculture to unskilled workers in the engineering industry. They find that the nominal gap increased from about 10 percent in the 1860s to about 30 percent by 1900. Drawing conclusions about the urban-rural divide from wages in different sectors can be problematic for two reasons, however. First, the gap could reflect industry-specific rents that are unrelated the urban wage premium. Second, the engineering industry was heavily concentrated to the largest cities, and in particular, to Stockholm. Wages in Stockholm were significantly higher than those in the rest of the country.<sup>2</sup> A comparison of this industry to agriculture might therefore reflect the premium for the largest cities and not necessarily be representative for urban areas in general.

There are also several studies finding declining disparities after the onset of Swedish industrialization. Enflo, Henning and Schön (2014) and Collin (2016) show that regional inequalities declined in the late nineteenth century while they were increasing in other countries where comparable information is available (See Figure 3 in Enflo and Rosés, 2015). The same is true for inter-industry differentials for male workers in manufacturing, as presented by Prado (2010). Williamson (1997) found in a study of the growth of unskilled wages relative to GDP per capita, what has later been named the “Williamson index”, that wage growth outpaced average income growth in Sweden over the 1870–1913 period. Prado (2009) has criticized the wage series used by Williamson, however, as it relates to urban construction workers and manufacturing industries that are not representative of the unskilled worker group as a whole. Our new wage series is based on a much larger sample of wage observations from both rural and urban areas and circumvents the problems that results from Williamson’s choice of data.

With the exception of Lundh and Prado’s (2014) study of the urban-rural wage gap and Williamsons’s (1997) of wages compared to GDP per capita, these studies do not speak directly to the mechanisms underlying Lewis’ and Kuznets’ theories. With our new detailed data, we are able to look in much more detail at these factors. The long time period and the broad geographical coverage of the data makes it a better indicator of working-class wages than the series used in previous studies. This allows us to put it in the perspective of GDP per capita growth and to test whether wage growth was lagging, as well as if rural incomes declined relative to towns. In the next section, we explain how we create this new database.

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<sup>2</sup> A comparison of our national estimate to the independent estimates for Stockholm by Söderberg (2010) and Bagge, Lundberg and Svernilson (1935) indicate that wages in the capital were on average 50 percent higher in the nineteenth century.

## 2. New Source for Construction Workers Wages, 1831–1900

Our data consist of wages collected in price currents for building materials and labor services sent in from the County Administrative Boards (*Länsstyrelsen*) to the Board of Public Works and Buildings (*Överintendentsämbetet*, henceforth the Board). The Board was responsible for oversight of all construction work undertaken by the state, which included reviewing all drawings and cost estimates for buildings and bridges built on behalf of the crown as well as responsibility for maintenance and construction of certain types of buildings (Mellander, 2008). Since costs varied throughout the country, the Board had to have access to accurate price information for different locations in order to assess the cost estimates. To this end, County Administrative Boards were made responsible for collecting going rates on construction materials and wages for all bailiwicks and magistrates and sending the information to the Board each year (Kungl. Bref 11 dec 1816; *Cirkulär till Läns Styrelser...* 1845-02-04). Either because the instructions were not always followed or because forms have gone missing (or both), not all bailiwicks and towns are represented. Furthermore, not all units are represented each year. The instructions for the County Administrative Boards were clarified in 1845, and in order to simplify and rationalize the process, preprinted forms were taken into use. This means that the data quality is considerably better after 1845, both in geographical coverage and in terms of consistency in the wages reported. Before 1845, it was not unusual for different bailiwicks to report wages for different kinds of occupations, which means that for some locales we only have data on helpers for some years, whereas others reported additional types of wages, such as for smiths. This notwithstanding, the detail of the material is still a great improvement on previously available data.

Bailiwicks sent copies of the price currents to both the Board and to The Fire Insurance Board (*Brandförsäkringsverket*) who used the price estimates to assess the value of fire insurance objects. According to one account, valuations were carried out by two men from the magistrate appointed by the county governor together with “sworn” master builders/bricklayers in towns, and in the countryside by the bailiff (*häradshövding*) together with two public officials (Bylund, 1934, p. 123).

We have handcoded the wage information from the forms into a database. The data is organized at bailiwick-year or town-year level and refer to four occupations throughout the whole period: helper, carpenter, mason, and teamster. The wages are given for a full days work. Starting in 1865 the forms specify a day’s work to consist of 10 hours. Before that, no information about working hours is provided. The question of how many hours a day’s work consisted of before working hours were regulated is not possible to answer with certainty since

this varied a lot between occupations, regions and time of year. Since there is no information about how many hours a day's work was supposed to consist of in our price currents before 1865, unlike the period after when they explicitly refer to ten-hour days, we have decided to report day rates rather than hourly rates.

One potential problem with wages during this period is that workers were sometimes paid entirely or partly in kind. However, since the reporting system in our data was not entirely standardized before 1845, a few bailiwicks reported the information that they considered important. This means that for some locations and years, it is specified if workers were partly compensated in kind by means of food. Wage rates where we know that workers were not paid in kind are consistent with the wage level for other locations. Where specified, meals made up 50% of the day rate. Based on this, our conclusion is that the wages in the database refer to the monetary cost of hiring day laborers.

What type of areas does our data cover? The bailiwick was the administrative unit responsible for collecting taxes and other levies and was organized under the County Administration Board. For towns, the same function was fulfilled by the magistrate, who in that case was the entity reporting wages. The average bailiwick on the countryside encompassed around three to four parishes and the number of bailiwicks (including town magistrates) in the country was 216 in 1850 and 198 in 1900. Since our data includes both bailiwicks in the countryside as well as towns, the coverage is very broad in terms of geography, economic development, and social structure. The data cover both larger and smaller towns, including Göteborg and Malmö, but does not include Stockholm. However, there are independent estimates for Stockholm provided by Söderberg for the period prior to 1865 and by Bagge from that year onwards which have been included in the dataset.

Table 1 details the distribution of bailiwicks included by year and urban/rural status. The total number of bailiwicks varies but is fairly stable after 1845 at around 168. Before that year, there is an increase from about 50 bailiwicks in the 1830s to 80 in 1840 and then 161 in 1845. For the earlier years, there's a high degree of volatility in the number of reporting areas, however. In 1830 there are only four price currents preserved, which is why we start the series in 1831. The lowest number of bailiwicks after 1845 is for 1860, when 135 places reported wages, while the maximum is for 1890, when 168 places provide data.

Within the sample, the proportion of towns is very stable after 1845 at around 40 percent. Before that year there is a higher proportion of towns: 75 percent in 1831 and 66 percent in 1835. In what follows we take great care to make sure that our findings are not confounded by such changes in the distributions of the sample over time.

**Table 1:** Number of Reporting Areas in the Dataset by Year and Urban/Rural Status

<b>Type / Year</b>	1831	1840	1850	1860	1870	1880	1890	1900
Rural	13	27	95	77	89	101	100	93
Urban	40	53	66	58	65	66	68	65
Share urban	75%	66%	41%	43%	42%	40%	40%	41%
<i>Total</i>	53	80	161	135	154	167	168	158

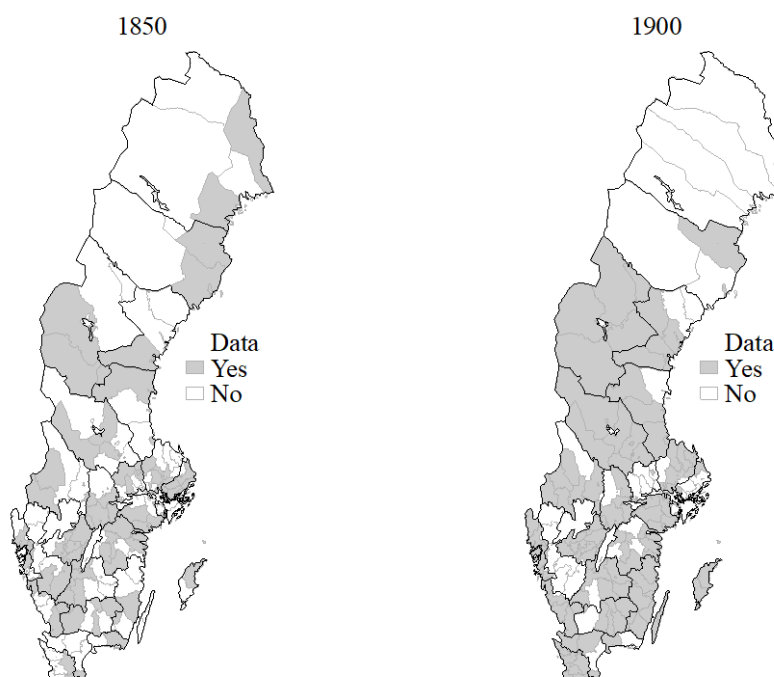
To get a better idea of the geographical distribution of the sample, the map in Figure 1 shows the geographical coverage in 1850 and 1900 respectively. As can be gauged from the map, the geographical coverage increases over time and contains more places in the north and south in 1900 compared to 1850. The Mälardalen region around Stockholm is well covered at both times. While the number of bailiwicks in our dataset remains stable from 1850, as can be seen in Table 1, the total number of bailiwicks decreased (and average size increased) so in 1900 the share of bailiwicks covered in our data is higher than in 1850. Importantly, apart from the most remote parts of northern Sweden, there does not seem to be any bias in coverage towards more densely populated areas which might otherwise have led to an overrepresentation of more developed areas.

One possible worry is that wages reported by the bailiwicks and towns might not reflect going market wages. To check the reliability of our series we can compare them to existing estimates of wages drawn from other sources. The closest comparison is the series on wages for construction workers hired by municipalities presented by Bagge, Lundberg and Svernilson (1935). They collected information from wage rolls in nine Swedish towns between 1875 and 1930.<sup>3</sup> We have access to data for the same towns for most years over the period up until 1900, allowing us to compare the rates found in our data to those described by Bagge, Lundberg and Svernilson, which are produced from a different source from ours. A close correspondance would suggest that our wages can be taken as an indicator of actual going wages rates. In Appendix A, we relate their data to our new series for towns in years when they overlap. It is reassuring that the two series give a very similar picture.

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<sup>3</sup> From 1860 in the case of Stockholm.

**Figure 1:** Map with geographical distribution of observations in 1850 and 1900.



An alternative source of wages is those of day-laborers in agriculture collected by Jörberg (1972), starting in the eighteenth century. While there could be sectoral wage differences that introduces a wedge between wages of unskilled workers in construction and in agriculture, a close correspondence of the two series would mean that our wage data can be taken as an indicator of wage rates for larger groups than just construction workers. In Appendix A, we present an additional comparison relating our wages for helpers to those of day workers in agriculture from Jörberg. Our series for rural areas matches the day wages of casual labor in agriculture very closely until the 1880s. After this time, helper wages grow slightly faster even though the overall pattern of change is very similar.

### ***Hedonistic Wage Regressions***

The problem of incomplete, partial and changing samples is a challenge to almost all historical wage studies. In our case, the problem results from the fact that the bailiwicks and towns reporting wages are not fixed over time. In addition, some areas did not report wages for all occupations in a certain year, even though most did. To confront the challenge of a changing sample, we apply the technique pioneered by Margo (2000) to estimate region and occupation-specific wages for ante-bellum United States. Margo used material collected from US military

forts on wages of civilians hired to do construction, maintenance, and clerical work. A similar approach was used by Clark (2005) and more recently by Radu (Forthcoming).

The wage regression we estimate is of the following form:

$$(1) Wage_{i,j,t} = \beta_1 Bailiwick + \beta_2 Occ + \beta_3 Year + \beta_4 (Occ * Year) + \beta_5 (Urban * Year) + \beta_6 (Occ * Urban)$$

where *Bailiwick*, *Occ* and *Year* are dummies representing each individual bailiwick, the four occupational categories: helper, carpenter, mason and teamster, and the 15 benchmark years from 1831 to 1900 respectively. The ensuing two terms, *Occ \* Year* and *Urban \* Year*, are interactions capturing change over time. The first term estimates how the relative wage for the four occupational categories evolves, while the second term captures changes in the relative wage of urban areas. The final term: *Occ \* Urban*, is an interaction between the dummies indicating occupation and urban/rural status, allowing the return to occupation to vary across rural and urban contexts.

This regression specification allows us to account for the fact that bailiwicks come in and out of the sample, making our estimate of wages by occupational group and by urban/rural status independent of the bailiwicks reporting wages in a particular year. In the graphs below where we apply the hedonistic wage regression, we estimate wages keeping the distribution of bailiwicks constant over the whole period from 1831 through 1900. Controlling for the composition of the sample using the regression equation presented above, we can also assess how sensitive the results are to compositional changes by comparing with the results we obtain if we did not use the hedonistic wage regression. We find that in most cases, such as for the wage by occupation or the rural/urban gap, the results from taking a simple average and of using the regression method is very similar.

### ***Establishing Welfare Ratios***

To establish changes in the standard of living of the workers covered in our sample, we follow Allen (2001) in calculating welfare ratios. The method compares wages of workers to the cost of purchasing a basket of goods and allows for a comparison across countries in the number of baskets that a worker was able to afford. Allen provides two baskets, one that represents the



level of consumption needed for subsistence and one that reflect the consumption patterns needed to reach a respectability level of upkeep.

There is now a lively debate about the assumptions underlying Allen's calculations. Especially contested are his assumptions about number of days worked per year, as well as the contribution of different family members to household income (Stephenson, 2007; Humphries, 2013; Humphries and Weisdorf, 2017; Gary, 2018). Allen assumes a work year of 250 days and that a male worker would finance the cost of living for a wife and two children. While these criticisms are highly relevant for the interpretation of absolute living standards, it is not yet clear what implications they have for comparisons of wage levels since hitherto these assumptions are the same across countries. The only factors varying between different places, except for nominal wages and price levels, is the composition of goods included in the baskets, which are altered to better reflect local conditions. In the absence of comparative work on how to correct these assumptions for individual countries, we use Allen's data to chart real wages of unskilled workers in European capitals, and we apply the same method to our calculation of welfare ratios for Sweden. It should be kept in mind, however, that these are not to be taken as undisputed indices of absolute standards of living, but rather as indicators of comparative levels of real wages.

To calculate welfare ratios, we use the cost of a respectability basket compiled by Gary (2018). The basket includes, with one exception, the same goods as the respectability baskets for Northern Europe as calculated by Allen. Gary makes an adjustment for the higher consumption of fish in Scandinavia by assuming 13 kg consumption of meat and 13 kg of salted fish, instead of the 26 kg of meat assumed by Allen. Gary provide the cost of the respectability basket in the towns of Stockholm, Malmö and Kalmar. In our calculations, we use the cost of living in Stockholm. This likely underestimates living standards since we divide wages in the country as a whole with prices in the capital, which means that Swedish wages were probably higher than implied by our calculations. We are now ready to use our new wage series to chart the evolution of real wages for Swedish workers in the nineteenth century.

### 3. Did Workers Benefit from Economic Change? Real Wages by Occupation

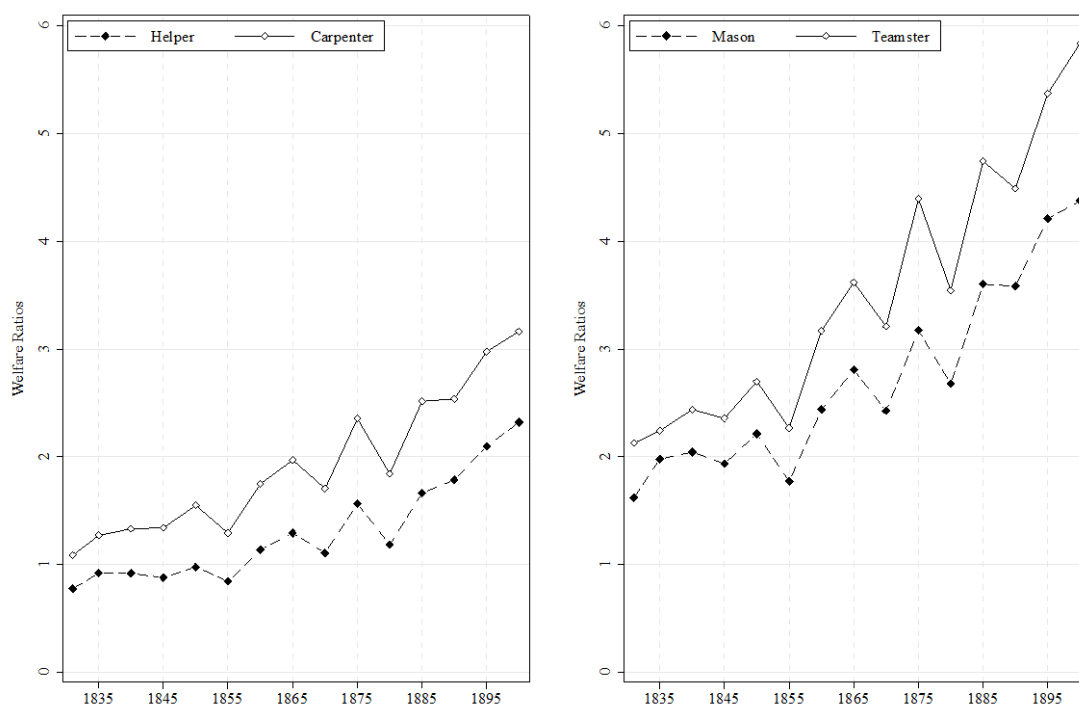
In this section, we start by tracking the evolution of real wages for our four categories of workers: helpers, carpenters, masons, and teamsters between 1831 and 1900. During these years, the Swedish economy witnessed radical changes. The period started with the culmination of the process of transformation in agriculture that produced an increasing number of landless

workers. It was followed by early industrialization taking off in the 1860s. These changes resulted in a growth of GDP per capita by 120 percent over the period. How was this reflected in living standards of the working class?

Figure 2 shows the development of real wages, measured as the number of respectability baskets that a worker could afford, for each of the four groups of workers. The values are calculated using the hedonistic regression outlined previously. It is evident from the figure that for all four groups of workers, real wages were stable or increasing slowly prior to the mid-1850s, and there is little indication of declining rates. For carpenters, wages grew by 17 percent while for the other groups, growth stopped at about 7 percent over the 1831 to 1855 period. Except for the drop in the mid-1850s, which coincided with an agricultural crisis and rising consumer prices, wages remained stable with only small variations on a year-to-year basis.

What the new series also highlights is the timing of the transition to continuous real wage growth. For the group of workers tracked in these data, this shift appears to have taken place from the mid-1850s onwards. Between 1855 and 1900, real wages grew at roughly 2 percent per year, leading to a growth by 150 percent over these 45 years.

**Figure 2:** *Welfare Ratios for Helpers, Carpenters, Masons and Teamsters, 1831–1900*



*Note:* Nominal wages by occupation is calculated using hedonistic wage regression, keeping all variables except year and occupation at the mean of the sample.

*Source:* Wages from the present database and cost of respectability basket from Gary (2014).

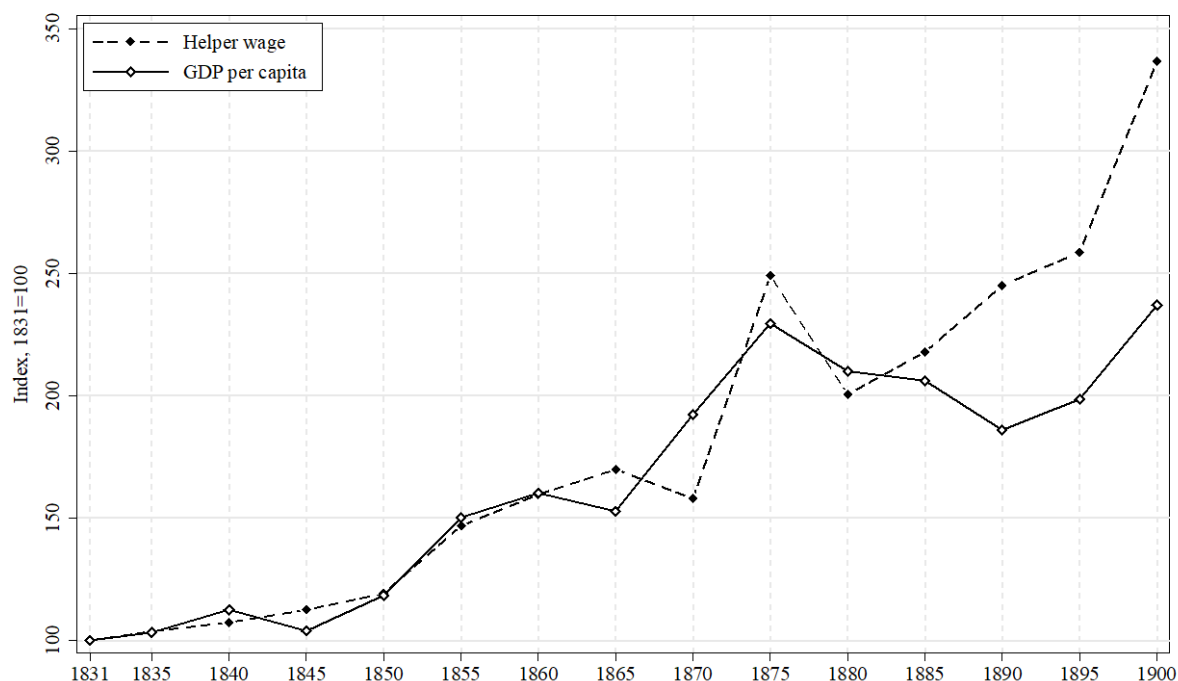
The fact that real wages did not deteriorate in the period prior to the 1850s speaks against a pessimistic interpretation of the consequence of the agrarian revolution for the working class. It appears as if increased specialization in agriculture and the growth of landless did not push down the living standards of unskilled workers. Our new data also highlight how the evolution of real wages entered a new phase beginning in the mid-1850s. From this point, real wages grew continuously for all four groups of workers. The radical economic shifts that characterized the nineteenth-century Swedish economy appear to have lifted the working class overall. But what were the distributional consequences of these changes?

A straightforward indicator of the relative standard of unskilled workers is the gap in wages relative to more skilled groups such as carpenters and masons. If the labor market position of unskilled workers worsened as the proletariat grew, we should expect the relative wage of helpers to decline relative to these more skilled workers. The evidence presented in Figure 2 tells a different story, however. Before the 1850s, unskilled helpers earned just below the amount needed to afford one respectability basket of consumption. The corresponding figure was about 1.3 for carpenters and 2 for masons. Between the 1855 and 1900, wage differentials decreased from 50 to 36 percent for carpenters and from 110 to 88 percent for masons. Growing real incomes was accompanied by an increase in the standing of unskilled helpers relative to more skilled workers in the same labor market.

While relative wages for helpers were not negatively affected, the working class as a whole could have lost out as gains from increased agricultural productivity fell disproportionately into the hands of landowners, or as economic growth benefited capitalist and the middle class. This the mechanism of increased inequality is discussed by Lewis. To examine how economic growth was distributed between workers on the one hand, and the groups of higher social standing on the other, Figure 2 plots the development of nominal wages for helpers compared to GDP per capita over the same 1831 to 1900 period. This measure is sometimes called the “Williamson index”.

Focusing first on the period before 1855, it appears that changes in unskilled workers’ wages tracked well the evolution of the economy’s productive capacity. Between 1831 and 1855, nominal wages and GDP per capita both grew by 50 percent. This suggest that self-owning farmers were not the sole beneficiaries of growing agricultural productivity during the agrarian transformation, the growing group of landless wage workers were able to lay claim to a proportionate share of growing incomes.

**Figure 3:** Index of Nominal Wages for Helpers and Nominal GDP Per Capita, 1831–1900 with 1831=100



*Note:* Nominal wages for helpers is calculated using hedonistic wage regression and keeping all variables except year and occupation at the mean of the sample.

*Source:* Helper wage from the present database; GDP and population from Schön and Krantz (2012).

While real wages were on an upward trend, the transition to continuous wage growth from the 1850s began with large swings in wages and GDP, as was also reflected in Figure 2. The comparison of nominal wages to average income in Figure 3 highlight this even more clearly. The economic crisis of the early 1870s ended the economic boom that had been building in the 1860s. Wages of unskilled workers grew in excess of productivity during the peak in the 1860s, but declined more than the economy after the crisis set in in the early 1870s. This was followed by a catch up in the middle of the ensuing decade followed by slightly slower growth during the crisis that followed in the early 1880s. From the 1880s there is a pronounced shift in the behavior of wages. From this time, nominal wages grew much faster than the economy. So much so that by 1900, nominal wages were more than 225 percent of their 1831 level, while GDP per capita at the same time had grown less than 150 percent. Since the growth of GDP per capita reflects the increase in incomes of all groups, including self-owning farmers, capital owners, white-collar workers as well as skilled and unskilled workers, the fact that wages for unskilled workers grew faster than incomes for the average person suggest that the income gap

between those dependent on wage labor for their living and those of higher social class fell over the course of Swedish industrialization.<sup>4</sup>

These patterns stand in stark contrast to the process described by Lewis. In his model, surplus labor pushes down wages of unskilled workers so that the benefits of economic growth accrue to capital owners and the middle class. In Sweden's economic transition, we see the opposite. Unskilled wages tracked the growth in nominal GDP per capita before the 1880s, and forged ahead after that. This clearly contrasts the experience of Britain and the United States, where real wages of laborers grew slower than average incomes or even stagnated. In Section 5, we take a closer look at this process through a comparison of real wages of unskilled laborers to comparative GDP per capita levels in Sweden and Northern Europe.

So far, we have dealt with the vertical aspect of inequality, i.e. that between unskilled and skilled workers, the middle class and capital owners and the scale most relevant to Lewis' hypothesis. Kuznets theorized instead that capital expansion would benefit laborers in cities while rural worker wages remain stagnant. With our detailed data, we are well positioned to examine whether this hypothesis is applicable in the Swedish case. This is what we turn to next.

#### 4. Urban-Rural Differentials

In this section, we compare nominal wages of workers in urban and rural areas. Our new dataset allows us to look at identical workers in different localities. This is a significant improvement over previous studies on the Swedish urban wage premium, as these have relied on comparisons of manufacturing workers to day-workers in agriculture. Our data also cover a much larger set of towns than any previous dataset. Kuznets hypothesized that only urban workers would benefit from the onset of economic growth. We have seen already that real incomes of unskilled workers increased markedly over the period after 1855. But how was growth distributed between workers in the urban and rural sector?

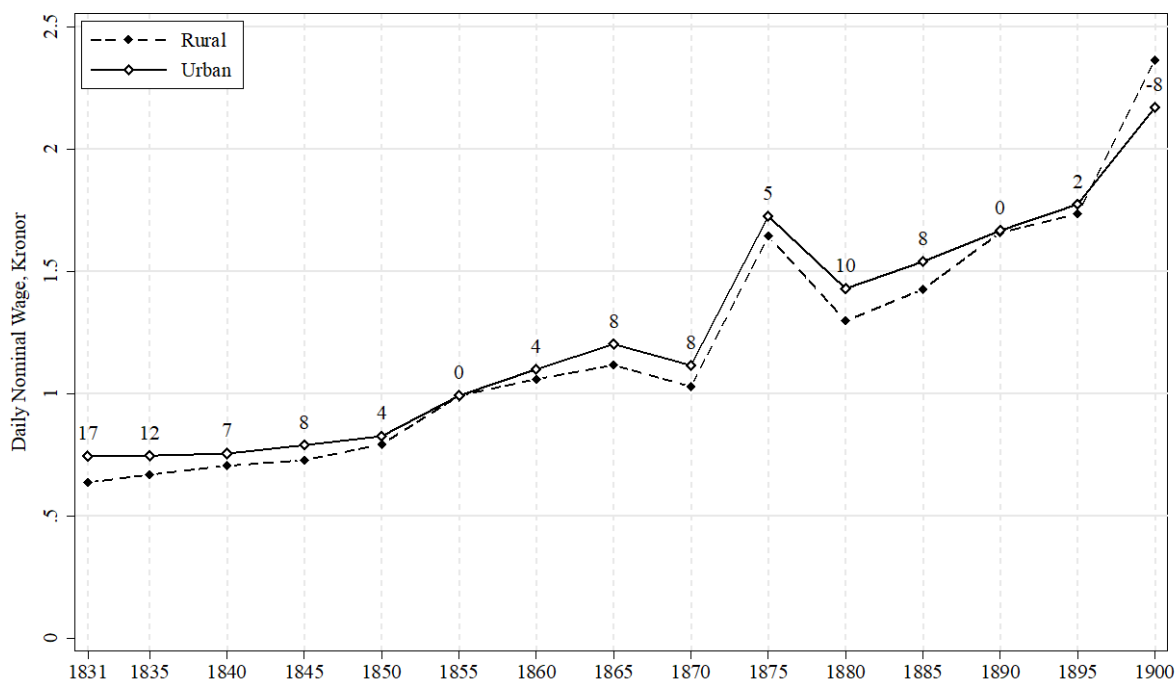
In Figure 3, we plot the evolution of average urban and rural nominal wages for helpers estimated with our data and using the same hedonistic wage regression as before. In the regression, we allow the gap between rural areas and towns to vary over time. The resulting

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<sup>4</sup> This is not the result of looking at construction worker wages. After 1860, we have access to information on manufacturing worker wages estimated by Prado (2010) drawing on the collection of records by Bagge, Lundberg and Svernilson (1933). These figures suggest that wage gains were even stronger for workers in manufacturing; wages for the average male industrial worker grew by 160 percent between 1860 and 1900 while wages for helpers roughly doubled. As noted earlier, the results are also very similar for day-workers in agriculture.

series, given in the figure, suggests a gap of around 10 percent throughout the period from 1831 to 1900; The differential never rise above 10 percent after the 1830s. While there was a slight increase in the gap with the onset of real wage growth from 1855, it is clear that both urban and rural areas followed in the transition to modern economic growth. Towards the end of the period, rural areas catch up and even supersedes their urban counterparts in 1900.

**Figure 4:** *Nominal Wages in Rural and Urban Places*



*Note:* Nominal wages for helpers in urban and rural areas is calculated using hedonistic wage regression and keeping all variables except year and urban/rural status at the mean of the sample. The numbers above the wage series for urban helpers denote the wage premium in percent.

*Source:* Nominal wages from the present database.

The gaps we find are substantially smaller than those depicted in previous research comparing wages in agriculture to those in manufacturing to back out urban-to-rural wage differentials. Lundh and Prado (2014) found an increase in the nominal gap from around 10 percent in the 1860s to about 40 percent in the 1880s and 1890s. Our data shows that this pattern likely results from differences between agriculture and industry rather than between urban and rural places.

The lack of surging urban to rural differentials in Sweden clearly contrasts with the findings for Britain and the United States. Williamson (1990) suggest that the nominal wage gap stood at 73 percent for England in the 1830s, and that it was on the rise between 1797 and 1851. For the US, Lindert and Williamson (2016) similarly find that between 1800 and 1860,

the urban-rural gap for male common laborers rose from 1 to 27 percent in the North and from 8 to 28 percent in the South. Sweden also breaks away from the general pattern in today's developing countries. Squire (1981, p. 102) estimated, for example, an average gap in the developing world of 41.1 (figure cited in Williamson and Lindert, 2016).

So far, we can conclude that industrialization did not breed inequality in the Swedish case. Wages of unskilled helpers tracked the growth of the economy up until the 1880s and superseded the increase in average incomes thereafter. The same was true for urban-rural wage differences which remained mostly stable throughout this process, suggesting that both urban and rural places shared in the growth of real wages. To assess the uniqueness of the Swedish experience, the pattern of real wages in relation to average incomes must be compared to a larger set of countries. In the ensuing section, we contrast welfare ratios of unskilled workers in Sweden to those in the leading cities of Northern Europe around the same time.

## 5. A Comparison with Northern Europe

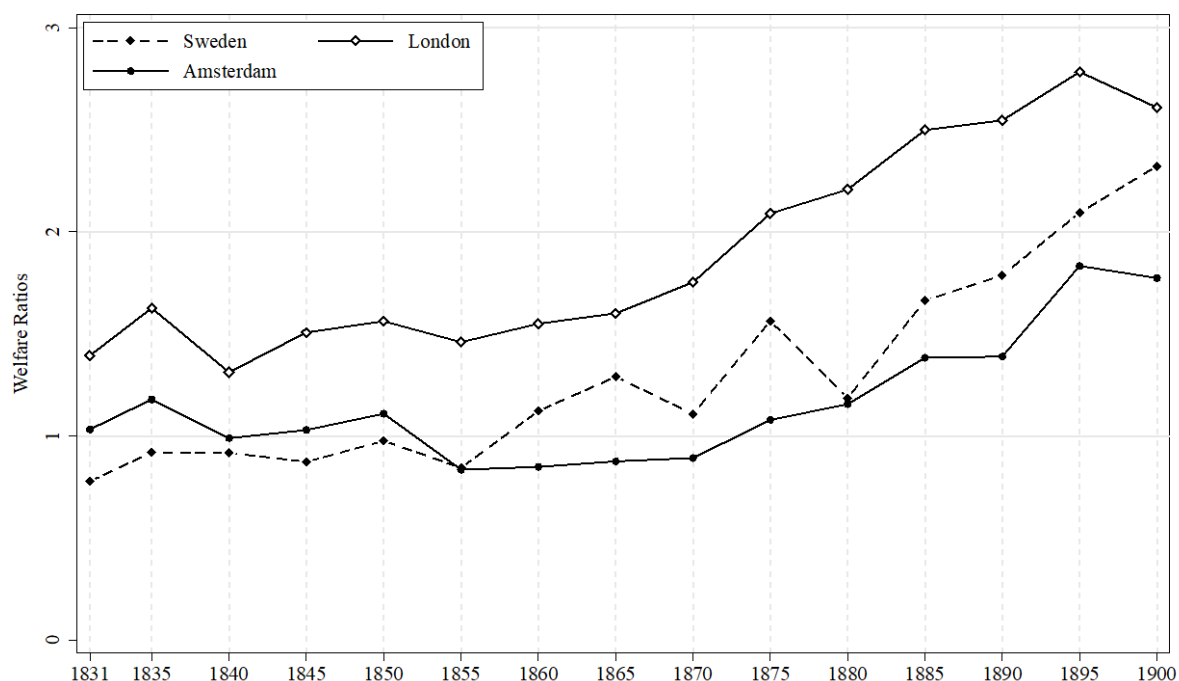
The collection of real wages for construction workers by Robert Allen makes it possible to compare our wage series with a number of other places. We focus the comparison on London, Amsterdam, Antwerp and Paris. These cities had the highest wages of those in Allen's database during the nineteenth century, substantially higher than in Southern and Eastern Europe. We begin by plotting welfare ratios, using respectability baskets, of unskilled helpers in Sweden and compare with the corresponding rate in London and Amsterdam using data from Allen (2001). The results are shown in Figure 5.

The graph shows Sweden lagging behind the two capitals at the start of the period. Swedish laborers earned around 90 percent of the amount needed to purchase a respectability basket for a family in the 1830s and 1840s. The corresponding rate in Amsterdam was around one, while London was ahead with 1.5. However, Swedish wages overtook those of Amsterdam from the 1860s onwards. Except for the period when there was a sharp fall in wages in the early 1880s, Swedish wages were about 20 percent higher than in the Dutch capital throughout the late nineteenth century. Wages of unskilled workers in Sweden were also catching up with those in London as the British advantage fell from around 80 percent in the 1850s to about 40 percent by the 1890s.<sup>5</sup>

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<sup>5</sup> It is important to note that the patterns we observe in Figure 5 does not appear because we compare wages in capitals with wages for Sweden as a whole. Stockholm wages were even higher, and our basket underestimates Swedish wages as prices are for Stockholm. This is also true for the countries we compare, wages are in general higher in the capital than in the interior (See for example Williamson, 1990).

**Figure 5:** Comparison of Real Wages for Unskilled Laborers in Sweden, London and Amsterdam.



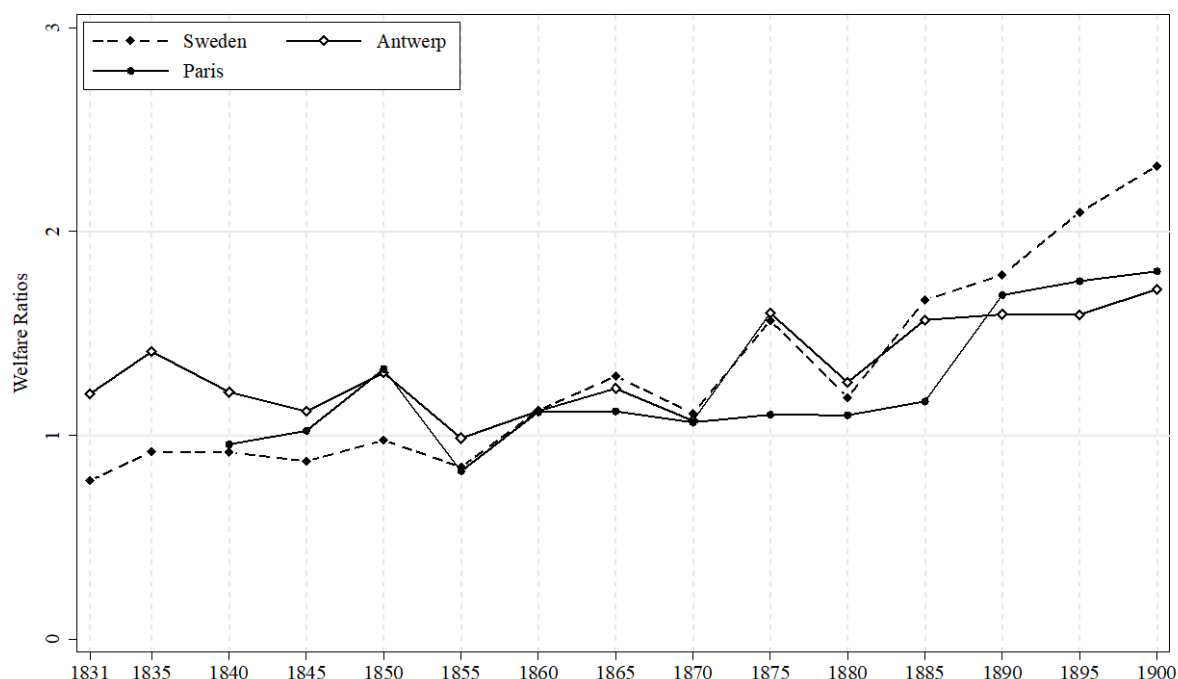
*Note:* For Sweden, nominal wages by occupation for is calculated using hedonistic wage regression, keeping all variables except year and occupation at the mean of the sample.

*Source:* Sweden: Wages from the present database and cost of respectability basket from Gary (2014); Wages and cost of respectability basket for London and Amsterdam: Allen (2001).

Figure 6 extends the comparison to Antwerp and Paris. The figure shows Swedish wages outgrowing those in Paris around the same time as those in Amsterdam and remained higher than in the French capital throughout the rest of the nineteenth century. For Antwerp, the largest city in one of the leading industrial economies at the time, wages were growing faster than in Amsterdam and Paris. Swedish wages followed the level in Antwerp from about 1860, and outgrew them from 1885.



**Figure 6:** Comparison of Real Wages for Unskilled Laborers in Sweden, Antwerp and Paris.



*Note:* For Sweden, nominal wages by occupation for is calculated using hedonistic wage regression, keeping all variables except year and occupation at the mean of the sample.

*Source:* Sweden: Wages from the present database and cost of respectability basket from Gary (2014); Wages and cost of respectability basket for Antwerp and Paris: Allen (2001).

The growth of Swedish wages is impressive seen in this comparative light. Only London had higher levels by the end of the nineteenth century.<sup>6</sup> This implies that unskilled workers in Sweden were among those with the highest comparative living standard in the nineteenth century; wage rates in the capitals of Southern and Eastern Europe, as well as in other parts of the world, were substantially lower than those in the cities compared in Figure 5 and Figure 6. Was the high comparative standard of living a reflection of the fast growth of the Swedish economy in the latter half of the nineteenth century? To examine the role economic progression played for expanding real wages it is necessary to put the welfare ratios presented previously in the context of GDP per capita levels. Was it simply that Sweden outgrew these countries that explains why unskilled laborers became better paid?

Comparing welfare ratios of unskilled workers to GDP per capita levels can be viewed as a corollary to the inequality extraction ratio introduced by Milanovic, Lindert, and Williamson (2010). Instead of comparing the difference between actual inequality to the maximum amount

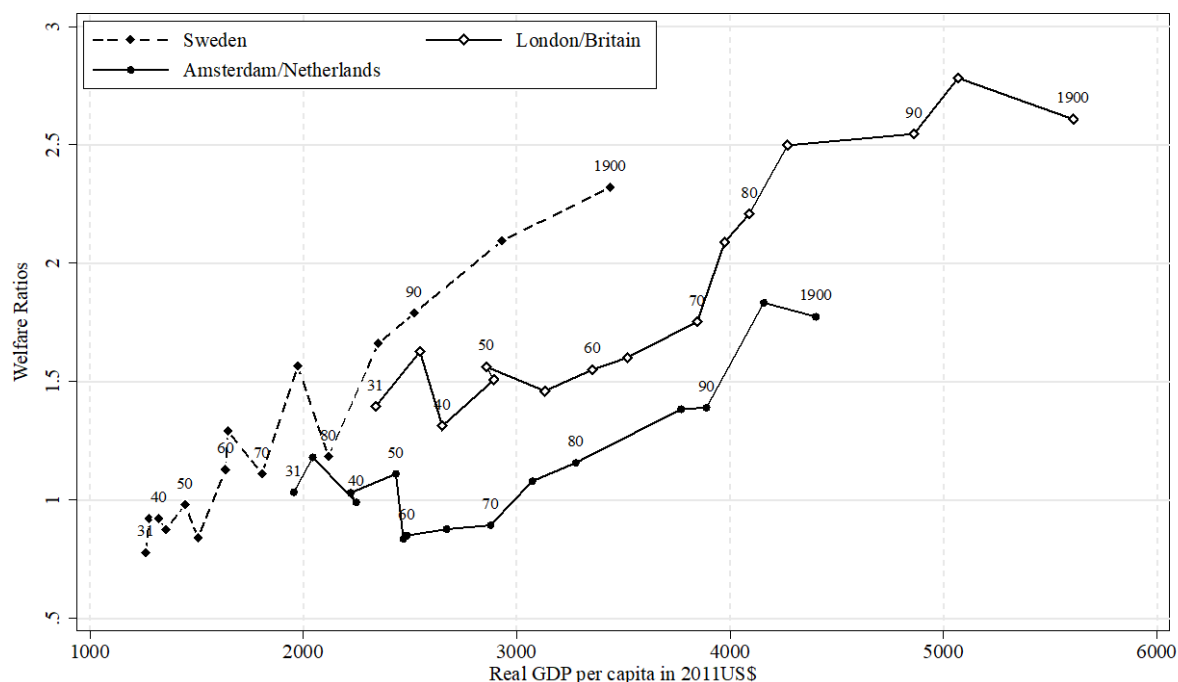
<sup>6</sup>See, however, Stephenson (2018) for a critique of the London wage series before 1800.

of inequality possible to attain at a certain level of GDP per capita, we compare how large a share of the growing economic pie that unskilled workers were able to grab. This is clearly related to the theories of Lewis and Kuznets, who both suggest that GDP per capita will grow faster than unskilled wages at the early stages of economic development. In Figure 7, we plot on welfare ratios the Y-axis, just as in Figure 5 and Figure 6, and on the X-axis we show the comparative level of GDP per capita in Sweden, the Britain and the Netherlands respectively, taken from the latest release from the Maddison-project (Bolt and Van Zanden, 2014).

The figure shows that the spurt in Swedish wages was not simply the cause of a rapidly growing economy. In 1880, when Swedish per capita income levels were at the level that the Netherlands had attained by 1840, wages were higher in the Swedish case. The same is true in comparison to Britain. While Britain had the same level of GDP per capita in 1831 as Sweden in 1885, welfare ratios of unskilled workers was higher in Sweden than in London at the same level of per capita income.

The patterns of real wages over the path of development are very revealing. Consider the period of time when the three countries grew from GDP per capita levels of 2 000 dollars (in 2011 levels) to about 3 500. In Sweden this happened between 1880 and 1900, in Britain before 1865, and in the Netherlands during the 1831–1880 period. At the course of this transition, Swedish welfare ratios grew from around 1.5 to just below 2.5. In Britain and in the Netherlands, in contrast, ratios remained mostly stable at 1.5 in the UK case and at around one in the case of the Netherlands.

**Figure 7:** Plot of Real Wages for Unskilled Laborers and GDP per capita in Sweden, London/Britain and Amsterdam/Netherlands.

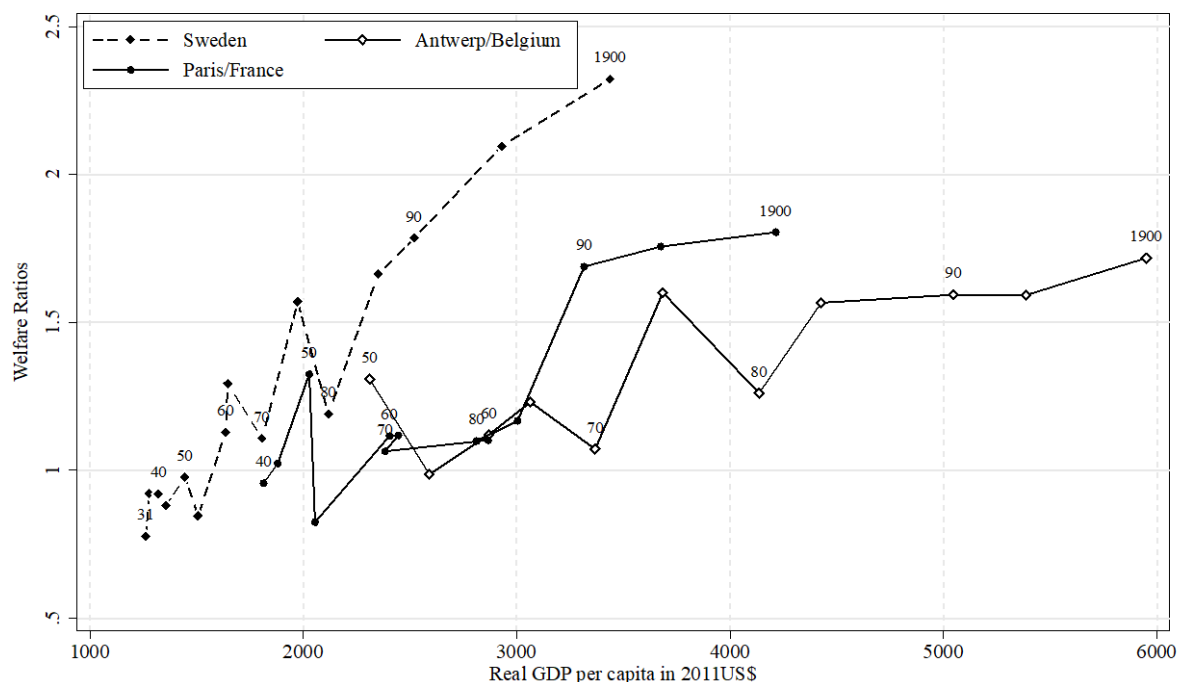


*Note:* For Sweden, nominal wages by occupation for is calculated using hedonistic wage regression, keeping all variables except year and occupation at the mean of the sample. Numbers above lines denote the year which the observation refer to.

*Source:* Sweden: Wages from the present database and cost of respectability basket from Gary (2014); Wages and cost of respectability basket for London and Amsterdam: Allen (2001); GDP per capita from Bolt and Van Zanden (2014).

Figure 8 once again extends the analysis to Antwerp and Paris and welfare ratios of workers are compared to GDP per capita figures in Belgium and France respectively. The same pattern that appeared in the comparison with London and Amsterdam also appears here. At a given level of GDP per capita, Swedish wages were higher than those in Antwerp and Paris. Between GDP per capita levels of 2000 and 3000 dollars, wages remained mostly stagnant in Paris and Antwerp, while for Swedish workers they almost doubled.

**Figure 8:** Plot of Real Wages for Unskilled Laborers and GDP per capita in Sweden, Antwerp/Belgium and Paris/France.



*Note:* For Sweden, nominal wages by occupation for is calculated using hedonistic wage regression, keeping all variables except year and occupation at the mean of the sample. Numbers above lines denote the year which the observation refer to.

*Source:* Sweden: Wages from the present database and cost of respectability basket from Gary (2014); Wages and cost of respectability basket for Antwerp and Paris: Allen (2001); GDP per capita from Bolt and Van Zanden (2014).

It appears that stagnating real wages were indeed a feature of economic growth in the leading countries in Europe at the time of their industrialization. However, Sweden clearly breaks away from this pattern. Here, wages of unskilled workers continued to grow throughout the process of early industrialization. The absolute level of wages was also higher. For a given level of GDP per capita, Swedish workers could afford about a basket more of respectability goods than in the major capitals of Europe. It should be repeated again that our comparison, if anything, likely underestimates the level of Swedish unskilled wages for two reasons. First, we compare a national average to rates in capitals where wages were most likely higher than in the interior. For Stockholm the nominal wage premium was about 50 % compared to Sweden as a whole. And second, we use Stockholm prices to calculate welfare ratios, and prices in the capital were higher than in smaller cities and rural areas (Lundh, 2013; Collin, 2016). Another worry could be that our wages are not representative for the experience of unskilled workers broadly.

Speaking against this is the fact that our series for rural helpers follow closely the existing evidence for day-rates in agriculture and wages for unskilled workers in manufacturing was even higher than the rates we use (Lundh and Prado, 2014). Sweden's experience clearly stands out.

## 6. Discussion and Conclusions

In this paper, we have analyzed the impact on workers of the economic changes taking place over the nineteenth century in Sweden using a new detailed dataset on construction worker wages. The information is drawn from forms sent in by the local bailiwicks on prices for building materials and labor services and includes wages for helpers, carpenters, masons, and teamsters. The data has a uniquely detailed geographical coverage, including a broad set of places on the countryside as well as a large proportion of towns - the vast majority of which have never been covered before.

We find that real wages were stable or increasing slowly prior to the mid-1850s but grew rapidly thereafter. Examining distributional impacts, we find that workers' wages tracked the evolution of GDP per capita until the 1880s and outgrew the economy from that point. Looking at patterns of wage growth across rural and urban areas we additionally find little evidence of dualism resulting from rural areas falling behind during the transition to modern economic growth. Taken together, our results suggest that the surplus labor models of Lewis and Kuznets, while relevant in the case of Britain and the United States, are not an accurate description of the Swedish experience. In Sweden, pre-capitalist growth did not hold down incomes for unskilled workers, and once industrialization set in, the working class appear as one of the primary beneficiaries.

The recent upsurge in research on inequality has highlighted how comparisons of average incomes can give the wrong impression of comparative living standards for poorer segments of society (Piketty, Saez and Zucman, 2018). Our study shows that this applies to the nineteenth century as well. Our comparison of unskilled wages in Sweden to the leading cities of Northern Europe show that standards of living were higher in Sweden at a given level of GDP per capita. Also, in the Swedish case, economic growth was concurrent with increasing real wages, while for the countries in the comparison, wages were stagnant or grew more slowly.

We can only speculate about the reasons for this distinct Swedish pattern. Migration to the New World is a relevant candidate. During the late nineteenth century, only Norway sent more migrants on a per capita basis, and this likely served to push up wages for unskilled

workers. However, Williamson and O'Rourke's (1995, 1997) calculations suggest that only about 40 percent of the catch-up of wages can be accounted for by this factor, so there is still a further 60 percent to be explained (See also Ljungberg, 1997; Bohlin and Eurenus, 2010). There are two further complications to this argument. Migration cannot explain why Swedish real wages were higher also in the years prior to when immigration made a significant impact on the economy, with the first wave of emigration in the 1860s. In addition, the pattern of selection of migrants show that they were drawn from the middle rather than from the bottom of the class distribution (Sundbärg, 1913).

In the recent discussion, inclusive political institutions has been advanced as a more important factor for the development of inequality than external economic forces (Acemoglu and Robinson, 2000, 2015). The role of institutional factors in the Swedish case is, however, ambiguous. In a recent essay, Bengtsson (2017) details the extent of political inequality in Sweden around the turn of the nineteenth century. In the municipal elections a minimum level of income or wealth was needed to vote, while, among those with voting rights, the number of voters depended on economic status. In rural municipalities, a larger landowner could hold a majority of votes, and since incorporated businesses also held voting rights, they were able to control a large fraction of votes in company towns. Among the countries compared by Aidt et al. (2006), Sweden had the lowest share of adults with voting rights around 1900: 15 percent, which is significantly lower than its Nordic neighbors, the Netherlands, Britain and France. At the local level, elections were even more unbalanced. Not surprisingly, public policies reflected the distribution of political power. Military expenditures were a priority over social spending, and in the 1880s, protectionist policies were introduced that raised food prices for the urban working class while benefiting large landowners (Bohlin, 2010; Bengtsson, 2017). This indicates that institutions did not favor workers. On the other hand, the liberalization of labor laws in the 19<sup>th</sup> century is generally considered to have been beneficial to workers and increased mobility (Lundh, 2010).

Unions were also not strong enough to make an impact on the wage structure at the time. While the labor movement grew influential in the interwar period, it was still in its infancy at the end of the nineteenth century as union density was still below 10 percent (Donado and Wälde, 2012). The right to collective bargaining over wages was only won in 1906 through a compromise with employers, and it would take many years before collective agreements covered a majority of workers (Nycander, 2008). The state, as a general matter, appear to have remained uninvolved in labor relations, but intervened on behalf of employers in several cases

such as with the introduction of a law in 1899 that made it illegal to stop strikebreakers (Casparsson, 1966; Bengtsson, 2017).

The Swedish population was homogenous, and according to some measures, very literate by comparative standards, which could possibly have made workers better able to act on the opportunities brought by industrialization. Heffernan (1992) analyzed differences in geographical mobility between literate and non-literate conscripts in the Ille-et-Vilaine region of France during the latter half of the nineteenth century and found that the literate group had significantly higher rates. Sandberg (1979) has argued that Sweden for historical reasons had accumulated a human capital stock by 1850 that widely exceeded other countries at similar levels of income. By this time, the country had the lowest rate of illiteracy in Europe, and in the western world it was trailing only the United States. By 1890 only nine per thousand of the army recruits could not write (Cipolla, 1969). Formal education also saw a large expansion during the first half of the nineteenth century with compulsory elementary education introduced in the 1840s (Ljungberg and Nilsson, 2009). According to Sandberg (1979), Sweden had among the highest levels of enrollment in secondary schools and universities in Europe in 1900. Nilsson (1999) has pushed back on the idea that Sweden had an unusually high rate of literacy by criticizing the numbers used by Sandberg, however. Figures for literacy drawn from signatures and estimates of writing ability are significantly lower (See also Nilsson and Svärd, 1994).<sup>7</sup>

The reason for Sweden's particular pattern of real wage growth is a puzzle. Here we have just sketched out a number of possible and less plausible explanations why inequality did not increase as the Swedish economy modernized, the ultimate cause is for future research to investigate.

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<sup>7</sup> Williamson and O'Rourke (1997) similarly argue that the Swedish catch-up of wages cannot be accounted for by higher literacy rates.

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## Appendix

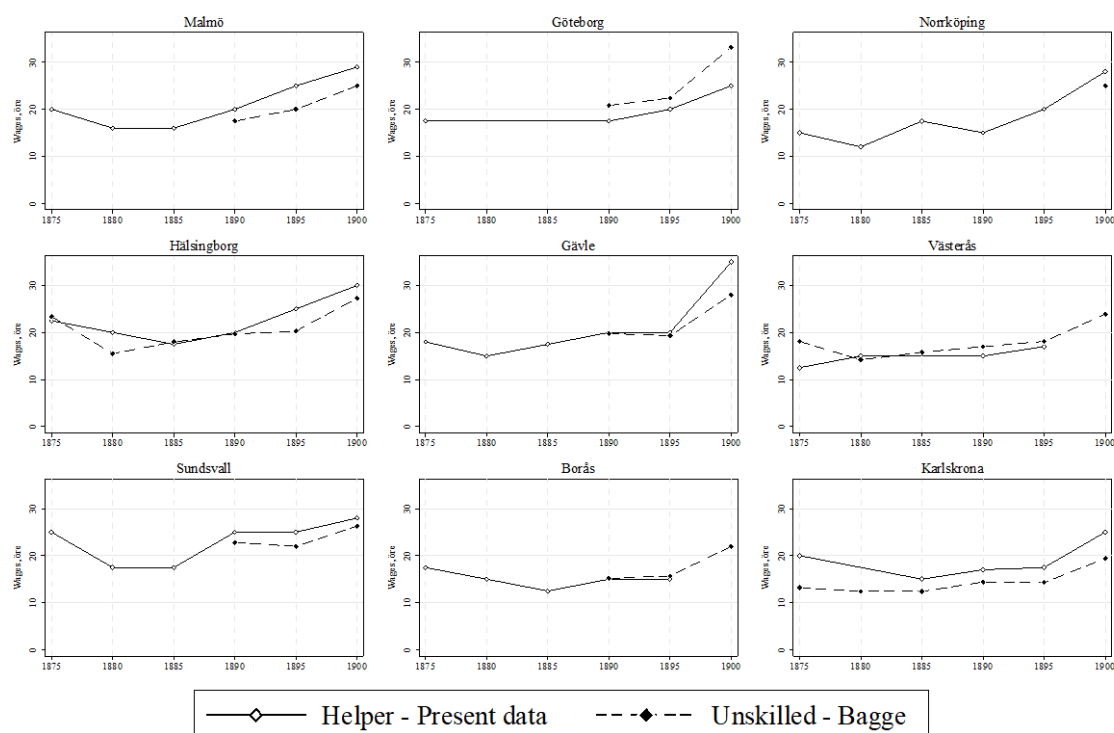
In this appendix we compare existing series of unskilled wages to those in the new dataset. We begin with a comparison to the series of wages for unskilled workers in municipal construction presented by Bagge, Lundberg and Svenilsson (1935) followed by the data on day-wages in agriculture from Jörberg (1972).

### *Comparison to the Bagge, Lundberg and Svenilsson (1935) Series*

Bagge, Lundberg, and Svernilsson (1935) has produced wage series for municipal construction workers in some towns between 1865 and 1930. For the 1875–1890 period, in addition to Stockholm, they present wages for four towns: Helsingborg, Västerås, Visby and Karlskrona. Our data cover these four towns as well during this period. For the 1890 to 1900 period the Bagge-sample expands and consists of nine towns: Gothenburg, Malmö, Norrköping, Helsingborg, Gävle, Västerås, Sundsvall, Borås and Karlskrona. Norrköping enters the sample from 1896. Our data covers these towns as well, with the exception of Västerås after 1890.

Figure 1A presents a comparison between our data for helpers and the Bagge-data for unskilled workers in the towns that are covered in both datasets. The overall takeaway from the comparison is that the two series follow each other fairly closely. Special attention should be paid to the series for Helsingborg, Västerås and Karlskrona where there are many years with data from both sources. In those cases, the fit between the series is very close. Overall the correlation between the two series is 0.92 with an adjusted R<sup>2</sup> of 0.65.

**Figure 1A:** Comparison with the Bagge-data for Nine Towns. Hourly Wages from 1875 to 1900



Source: Nominal wages for helpers in towns from the present database and for unskilled construction workers from Bagge, Lundberg, and Svennilson (1935).

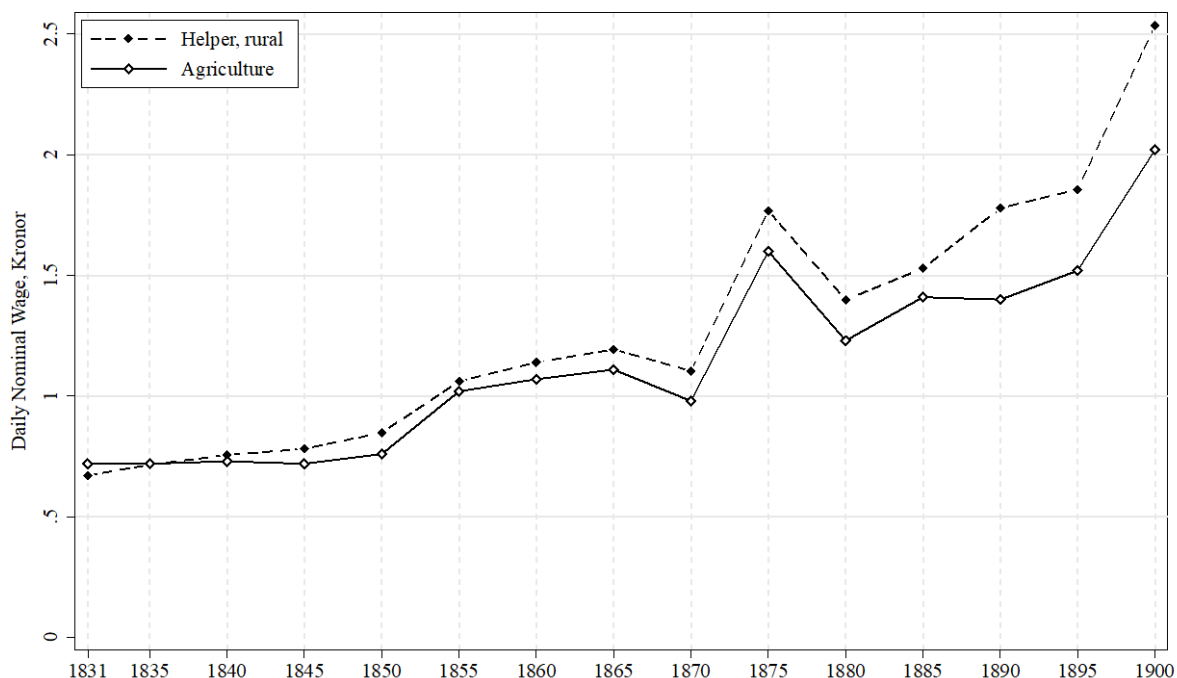
### **Comparison to Jörberg (1972) Series for Agriculture**

Jörberg (1972) presents an unweighted average of county day-wages in agriculture between 1732 and 1914. The data are drawn from market price scales negotiated in each county and used as administrative prices when assessing the cash value of dues in kind. While this leads to a worry that these are not market prices, Lundh and Prado (2014) presents a series of wages for unskilled agricultural workers after 1865 based on official statistics, which follow closely the series from Jörberg.

Figure 2A presents a comparison of the Jörberg series to our data for helpers in rural areas. While the two series both refer to rural workers, they relate to different sectors so there could be industry-specific premiums that creates a wedge between wages in the two economic activities. The sources are also different, our data has a larger quantitative basis and a wider geographical coverage. However, from Figure 2A it appears that the two wage series move very closely together. After 1885 there is some deviation as wages in agriculture grow slower than those of helpers. However, the overall pattern is very similar. We have also doubled checked

that our comparisons of wages in Sweden to those in Northern European cities is not affected much if we use the series for agricultural workers instead.

**Figure 2A:** Comparison with Jörberg's Series for Day-Workers in Agriculture



*Note:* Nominal wages for helpers in rural areas is calculated using hedonistic wage regression and keeping all variables except year and urban/rural status at the mean of the sample. The numbers above the wage series for urban helpers denote the wage premium in percent.

*Source:* Nominal wages for helpers in rural areas from the present database and for day-workers in agriculture from Jörberg (1972).