

## Article

## Inequality and the working class in Scandinavia 1800–1910: Workers' share of growing incomes



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## ABSTRACT

One of the major ways in which economic inequality can increase is when the development of wages of ordinary workers trail productivity and GDP growth, meaning that the increasing riches fall in the hand of other social groups (top employees, owners of land and capital). This paper investigates the relationship between wages and GDP in Denmark, Norway and Sweden from 1800 to 1910, using wage series for workers in agriculture as well as crafts and industry. It shows wages trailing GDP from the 1840s to the mid-1870s, with a particularly pronounced such trend in Norway. On the other hand, wages generally increase at the same pace as GDP in the 1870s, 1880s and 1890s. The early 1870s is a break point also for food real wages which start increasing at that point. Four explanations for the varying fortunes of workers are tested: price developments, population growth, emigration, and institutional changes. Variations in labour supply, stemming from population growth and emigration, are shown to be the most important determinant.

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### Desigualdad y clase trabajadora en Escandinavia de 1800 a 1910: participación de los trabajadores en los ingresos

## RESUMEN

Una de las mayores vías de incremento de la desigualdad económica se produce cuando el crecimiento de los salarios de los trabajadores ordinarios es inferior al crecimiento de la productividad y el PIB, lo que significa que el incremento de la riqueza va a parar a manos de otros grupos sociales (empleados de alto nivel, propietarios de tierras y capitales). Este documento investiga la relación entre los salarios y el PIB en Dinamarca, Noruega y Suecia, de 1800 a 1910, utilizando las series salariales de los trabajadores agrícolas, artesanos e industriales, y refleja que los salarios son inferiores al PIB desde principios de 1840 a mediados de 1870, con una tendencia particularmente pronunciada en Noruega. Por otro lado, el crecimiento salarial se mueve por lo general al mismo ritmo que el PIB en 1870, 1880 y 1890. El inicio de 1870 constituye un punto de ruptura para los salarios reales del sector de alimentación, que comienzan a incrementarse en dicha fecha. Se prueban cuatro explicaciones de las distintas fortunas de los trabajadores: crecimiento de los precios, crecimiento de la población, emigración y cambios institucionales. Las variaciones en términos de oferta laboral, derivadas del crecimiento de la población y la emigración, constituyen el determinante más importante.

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## 1. Introduction

One of the major ways in which inequality can increase is when the wages of ordinary workers do not increase at the same pace as the average income in the economy. In the United States, the real median wage of workers has stagnated for decades and is today still at the level of 1973, while GDP has increased sustainably. This wage lag means that the increased wealth has accrued to other groups, namely the upper middle class, top management and owners of capital, and that inequality has increased (Bivens et al., 2014). Within economic history, the relationship between wage growth and average income (GDP) growth is a classical issue. Since wage earners are the bulk of the lower strata of the income distribution, when they lag behind average income growth, it means that income inequality increases. Much research has been devoted to the issue of whether the living standards – of which wages are an integral part – of the working class in Britain rose in line with general economic improvement during the British industrial revolution (e.g. Feinstein, 1998; Allen, 2009).

This paper investigates the relationship between wage growth and GDP growth in Scandinavia – Denmark, Norway and Sweden – c. 1800 to 1910. All three countries, which in the twentieth century would become well-known for a strong degree of egalitarianism, industrialized during this period, which makes it interesting to investigate their development of income inequality during industrialization. Did the living standards of workers lag behind, as the pessimist side of the British debate would have it, or did they grow in line with overall incomes? (Cf. Feinstein, 1998; Allen, 2009.) The paper is descriptive in nature, utilizing the wage and GDP series calculated by macroeconomic historians during the last fifteen years or so, to establish when workers' wages rose in line with average incomes, when they rose faster and when they rose slower. The paper also discusses which factors affect the wages–GDP gap, focusing on price developments, labour force growth, emigration and working class activism. The paper is based on extant wage and GDP data for the three countries, and does not build on new archival research. We lack information about several key aspects – especially variations in unemployment and the combination within families of women's, men's and children's labour – of working class standards of living in this period; these will be pointed to, but it is outside the scope of the present paper to resolve them. The paper can thus be seen as an inventory of where we are with regards to understanding the standard of living of the Scandinavian working classes in the nineteenth century compared to general society, with pointers to where more archival research is needed.

## 2. Wages, workers' living standards and inequality in nineteenth century Scandinavia

### 2.1. Workers

The wage earners studied in this paper were a lower strata in society, and so when GDP grew faster than their wages, it means that the surplus was gained by the higher educated, or owners of land or capital. That means that inequality increased (Prados de la Escosura, 2008, p. 290). For the post-1900 setting, one would use national accounts data to study the distribution between capital and labour (e.g. Piketty, 2014; Bengtsson and Waldenström, 2015), but for the nineteenth century, the necessary data do not exist. For this reason, the wage to GDP ratio has been widely used in economic history (Phelps Brown and Hopkins, 1950; Williamson, 1997; Prados de la Escosura, 2008; Allen, 2009).

Since the purpose of the paper is to study the relative living standards of the working class, I will use wage information for

skilled and unskilled workers without formal education; workers who in the twentieth century would be referred to as “blue-collar” (in Danish/Norwegian/Swedish: *arbejder/arbeider/arbetare*). Williamson (1997) who popularized the wage-to-GDP ratio as an inequality indicator for the nineteenth century, explicitly focused on unskilled labourers. Labourers, not the least agricultural, are at the core of this paper as well but wages for skilled workers are used as well. All three Scandinavian countries were predominantly rural in the nineteenth century. In Norway and Sweden, around one tenth of the population lived in urban areas up to the mid-century, whereby urbanization ensued so that in 1900 28 and 22% of the population, respectively, was urban (Statistisk Sentralbyrå, 1978; p. 33; Statistiska centralbyrån, 1969, pp. 45–46). Denmark was more urbanized with 21% urban already in 1801; it stayed the same in 1850, then grew to 38% in 1901 (Danmarks Statistik, 1959, p. 5). One can infer from these figures that most of the working class in this period were rural workers, especially agrarian, and for this reason, studying agrarian workers is important for the present paper.

### 2.2. Inequality

What do we know about inequality in Scandinavia in the nineteenth century? Much of the Scandinavian research on inequality in the nineteenth century has focused on stratification in rural society, and groups such as crofters and other semi-proletarian and proletarian agrarian groups. The massive growth of the crofter group after the mid-eighteenth century has often been discussed as an important process of increased social differentiation (e.g. Winberg, 1975; Østerud, 1978, p. 96, 119–121, 129; Pryser, 1993). That rural differentiation which is based to a high degree on subsistence economies and differences in access to land falls outside of the study here. An important overlap with that debate is however the issue of access to common land and small-scale subsistence farming. Humphries (1990) has shown for the British case that enclosures increased lower-class families' dependence on a male breadwinner since they decreased the access of these families to commons for cows' grazing. Enclosures did not work in the same way in Scandinavia, but the share of the lower-class population with access to smaller plots of land did decrease there too, and so the dependence on wage labour increased. This means that the wage growth to GDP growth ratio becomes an even more salient inequality measure over time.

Previous quantitative estimates for inequality are scarce; of course, precisely this is an important rationale for the present paper. Especially, the measures that we have are quite low-frequency. Income inequality measures only begin in the 1870s for which researchers have measured the share of total income captured by top earners. On this measure both Denmark and Norway were quite unequal in this decade, with the top decile taking home 54% of Danish incomes in 1870, and 40% of Norwegian incomes in 1875. Both countries saw a slight decrease of inequality by this measure to the first decade of the twentieth century (Aaberge et al., 2016; Atkinson and Sogaard, 2016). Wealth data are scarce as well, but available for some years. The richest percentile's share of total private wealth was 56% in Denmark in 1789 and had decreased to 46% in 1908. In Norway, it decreased from 47% in 1789 to 36% in 1868 and then kept stable until 1912 when it was on 37% (Roine and Waldenström, 2014, Table 2A). In Sweden, the top percentile's share grew from 40% in 1800 to 42% in 1850 and 58% in 1900 (Bengtsson et al., 2017, Table 3). In short, the existing income and wealth inequality data, do not tell us much about the development of inequality in Scandinavia, as the data points are quite far apart. The cruder measure employed in this paper facilitates as more high frequency measurement of the development of inequality. From

the existing top income and top wealth shares studies, we could expect decreasing inequality from the 1870s to 1910 (Danish and Norwegian incomes) as well as increasing inequality from 1800 to 1900 (Swedish wealth).

### 2.3. *The study of wages*

Fortunately, the last ten to fifteen years has seen somewhat of a boom in the calculation of historical wage series. From this new macroeconomic history, I will use data for agricultural labourers for all three countries (Khaustova and Sharp, 2015; Grytten, 2007, 2009; Jörberg, 1972). For urban labourers, I have data for Denmark and Sweden (Dalgaard, 1926; Khaustova and Sharp, 2015; Söderberg, 2010; Sociala Meddelanden, 1927). Manufacturing workers are available from 1875 on in Denmark (Christensen, 1975; Abildgren, 2008), Norway (Grytten, 2007, 2009) and Sweden (Prado, 2010b). In several instances (i.e. all Swedish wages and the Norwegian agricultural wages; see Grytten, 2007, p. 352), the wages are only for men. This is a clear limitation of the data. The GDP per capita estimates used to calculate GDP growth are taken from Hansen (1974), Grytten (2004b) and Edvinsson (2005).

The main issue with the wage data as indicator of living standards of the working class relative to the average is the lack of knowledge about employment intensity. When we have hourly wages, how do we know how many hours a day they worked? And when we have daily wages, how do we know how many days a year? And how widespread was unemployment? For Finland Heikkinen (1997: 120) finds it reasonable to assume that urban workers in sectors like stevedoring and construction typically were unemployed 3–4 months a year in the period 1860 to 1913. In a recent paper, Humphries and Weisdorf (2016) claim that British workers rapidly increased their number of working days per year during the last decades of the 19th century. This means that the result of wages lagging behind GDP per capita, as Allen finds (2009), only holds if we assume no change in employment intensity, which Humphries and Weisdorf claim in fact occurred. Unfortunately, there are no such data for the Scandinavian countries in the period covered here. Instead, I will here only submit the suggestion that if a worker needs to rapidly increase his or her workload only to keep up with overall rising living standards, then the increased workload is in itself also a disamenity.

## 3. Factors affecting wages' share of GDP

Building on the extant literature, I will investigate the possible effects of four factors: price movements, population growth, emigration, and institutional factors.

### 3.1. *Prices*

In the nineteenth century, money wages were quite inflexible in the short run, which meant that short run fluctuations in real wages depended to a high degree on price changes rather than changes in money wages (cf. Flinn, 1974, p. 379; Lindert, 1985; Heikkinen, 1997, p. 113). In the United States, nominal wages became more responsive to inflation between the 1870s and the 1890s, because of increased concentration in industry, larger work places, and working-class organization (Hanes, 1993). These changes meant that workers could defend their real wages against changes in prices. The Scandinavian countries were later developers than the US in this respect; industrialization started especially after 1870, and trade unions' right to collective bargaining were recognized

by employers in Denmark in 1899 and in Sweden in 1906. We may, then, expect that for the period investigated here, 1800 to 1910, inflationary and deflationary episodes affected the wage – GDP relationship in the short run.

The price increases picture is very similar for the three countries from 1800 to 1910, with the main events to note being inflationary episodes in the 1840s and 1850s and deflation in the 1870s and 1880s (based on data in Grytten, 2004a; Edvinsson and Söderberg, 2011; Abildgren, 2009). Building on this historical background, we would expect wages to have lagged GDP in the inflation of the 1840s and 1850s, but not having decreased as much as nominal GDP during the deflation of the 1870s and 1880s. It is important to note that an increased wage to GDP ratio caused by deflation might not actually indicate an overall increase in the living standard of the working class, as deflation is associated with a slowdown of the economy and increased unemployment; I will come back to this factor in the discussion below.

### 3.2. *Population growth*

Recent economic history research on nineteenth century wages and the wage – GDP relationship has mainly worked within a neoclassical relative factor supply framework (i.e. O'Rourke and Williamson 1994). The focus on relative factor supply goes back to what Marx called “the industrial reserve army” and Lewis (1954) theorized as “unlimited supply of labour”. Essentially, if there are large numbers of very poor people in the rural sector, then the labour supply for expanding sectors, even with low wages, is very high and will restrain wage increases (cf. Allen, 2009). It is very complex to measure the industrial reserve army (Heikkinen, 1997, pp. 70–71), but nevertheless it is often put forward as an explanation of wage developments. Table 1 shows population growth per decade in the Scandinavian countries.

Population growth was particularly rapid from the 1820s to the 1850s, while it dropped in the 1880s and 1890s in Norway and Sweden. Many researchers have discussed the implications of population growth in the second quarter of the century. Winberg (1975) and Lundsjö (1975) have for Sweden stressed the growth of the proletarian groups during this period, as the share of rural households who owned land decreased from one half to one fourth. Likewise, Sejersted (1993, p. 67) for Norway has located the development of a proletariat on the bottom of society in the 1840s. (Also see Montgomery, 1951, pp. 14, 20; Pryser, 1993, pp. 328–9.) However, there is disagreement whether this growth of the proletariat also meant pauperization, or increasing income inequality. On Sweden, according to Utterström (1957, pp. 327, 347), agricultural real wages stagnated in the 1830s and 1840s, and according to Sandberg and Steckel (1988, p. 17) from the 1840s to 1870s “the increased agricultural productivity was ending up in the hands of the relatively well to do”. But Minde and Ramstad (1986, p. 93; cf. Myhre, 1986, p. 162) claim for Norway that the living standards of Norwegian workers grew at a healthy pace at the mid-eighteenth century.

Likewise, the interpretations of the consequences of the population growth turn-around after c. 1870 differ. According to Sejersted (1993), the over-supply of labour in Norway ended with the great wave of emigration to the United States in the 1880s. Jörberg (1973, p. 452) on the other hand has argued that after 1870 Swedish and Norwegian industry experienced greatly growing foreign demand but that wage increases were held back by the existence of a large rural labour surplus.

How do we know if population growth mattered for wages? Lindert (1985) tests the population pressure – wage hypothesis with short run wage regressions with labour force growth as an independent variable, but I do not believe that year-to-year effects

**Table 1**  
GDP per capita growth and population growth per decade, 1820–1899.

		1820s	1830s	1840s	1850s	1860s	1870s	1880s	1890s
DK	GDP p/c	0.45	0.73	2.18	−0.04	1.44	0.88	1.48	1.81
	Pop	0.98	0.64	1.00	1.24	1.08	0.98	0.98	1.11
NO	GDP p/c		1.28	0.27	1.81	1.86	1.13	1.21	0.95
	Pop	1.48	1.00	1.15	1.38	0.84	1.01	0.40	1.11
SWE	GDP p/c <sup>a</sup>	0.67	0.65	1.01	1.64	1.53	1.17	1.57	2.26
	Pop	1.12	0.83	1.04	1.00	0.86	0.94	0.45	0.68

Source: Maddison database. GDP/capita in 1990 US Dollars.

<sup>a</sup> According to Schön and Krantz' (2015) data, average GDP per capita growth rate was 0.4% in the 1820s, 0.67% in the 1830s, 0.97 in the 1840s, 1.3 in the 1850s, 1.17 in the 1860s, 1.02 in the 1870s, 1.05 in the 1880s and 2.46 in the 1890s. The picture is then very similar if these updated estimates are used (correlation over the decades is 0.92).

**Table 2**  
Gross emigration per 1000 inhabitants to the United States from Scandinavia, 1850–1913.

	1850s	1860s	1870s	1880s	1890s	1900–13
Denmark			1.97	3.74	2.60	2.80
Norway			4.33	10.16	4.56	7.15
Sweden	0.51	2.52	2.96	8.25	5.32	2.93

Source: Hatton and Williamson (1992: Table 1).

are the relevant expectation here, but rather wage effects 15–20 years after population increases (if they are caused by high fertility), as larger cohorts enter the labour force and exert an effect on the wage level. From this we might expect that wages will lag behind GDP in Norway ca 1830s to 1860s and Sweden from the 1840s to 1870s.

It is evident that this hypothesis partly overlaps with hypothesis 1, on price changes and nominal wage stickiness, which has also been pointed to above regarding the Swedish 18th century. This connection indicates a methodological conundrum of this paper: there are many factors in play, and it may be difficult to separate them from each other; using regression analysis on 19th century yearly wage data is problematic. But it is also a deeper, more historical point: population growth itself had a positive effect on prices (Lindert, 1985), so in this sense it is not surprising that in the 1840s and 1850s with vigorous population growth inflation was high. The deflation of the 1870s and 1880s on the other hand was not caused by demography but by monetary policy, as all three countries got on the gold standard in the early 1870s. But for the mid-19th century episode it is complicated to disentangle causes and effects.

### 3.3. Emigration

Another labour supply factor that has been argued to matter for wages in the late 19th century is migration, and especially the great emigrations from Europe to America. As we have seen, Sejersted (1993) claims that in the 1880s the over-supply of labour ends in Norway due to emigration; for Sweden Ljungberg (1997) has made the case that emigration in this period drove up real wages for the remaining workers. The scale of emigration to the United States is seen decade for decade from 1850 to 1913 in Table 2.

Both in Norway and Sweden we see accelerations in emigration in the 1880s (on Norway see Pryser, 1993: 59–68). There is an increase in Denmark too but to a much lower level. We would then expect effects on the wage-GDP-ratio in at least Norway and Sweden in or just after the 1880s: then, wages should increase faster than GDP.

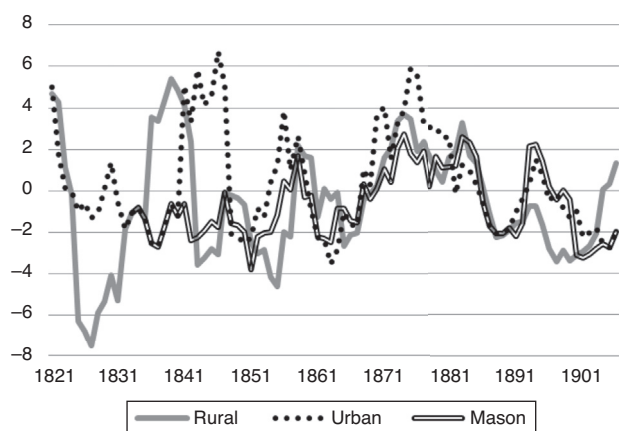
### 3.4. Institutional factors

Institutional factors might also matter. While shifts in labour supply were key in Feinstein's (1998, p. 651) analysis of the shifting fortunes of the British working class in the nineteenth century, he also argued that waves of working class activism from the 1810s to the 1840s increased workers' strength and thereby also their wage growth from the 1850s on. Relatedly, Naidu and Yuchtman (2013) have argued that repressive labour policies held down wages in nineteenth century Britain.

It is then worth to look also at labour movements and policies. The 1880s saw the breakthrough of labour movements in Scandinavia. During the European labour unrest of 1848, Norway and Sweden were relatively quiet, while Denmark's experience was more eventful. In Denmark, a movement of agricultural workers (*husmænd*) erupted in the late 1840s, which did lead to some pro-worker reforms, of which the reduction of corvée labour (*hov-eri*) was the most important (Olsen, 1962, pp. 51–54; Hansen, 1972, p. 136; Banggaard, 2008, p. 294f; Engberg, 2011). Norway did have a short-lived pro-poor social movement around 1848 in the Thranebevegelsen, but neither in Norway nor in Sweden were the social movements around 1848 as large as the Danish, or the will to reform as strong (Utterström, 1957, pp. 344–349, 352ff; Karlbom, 1967, pp. 116–134, 139; Pryser, 1993, pp. 326–331). From the institutional viewpoint, we might expect some positive effects on wages in Denmark post-1848, but probably not in Norway or Sweden.

For more long-lasting working class organization, Scandinavia had to wait until the 1880s. For Norway the leading labour historian Bull has pointed to “a small wave of class struggle” in the 1870s, but the labour movement was consolidated and politicized only in the 1880s (Sejersted, 1993, pp. 95f). Likewise in Denmark, a local section of the Socialist Internationale was formed in 1871 and rapidly grew, but was almost equally rapidly defeated by state repression (Engberg, 2011, pp. 383ff). The 1870s did see the first significant strikes in Scandinavia. Hansen (1972: 250–2) claimed for Denmark that organized workers won impressive wage increases through strikes in the first half of the 1870s; he finds even bigger worker gains in the 1880s. The 1879 sawmill strike was the first major strike in Sweden, and trade unions grew lastingly from the 1880s on; the 1880s was a decade of radicalism (Åmark, 1986, p. 65). From this overview, we might expect positive effects on wages in two periods. Firstly, we might wonder if the social movements in Denmark around 1848 caused an uptick in wages. Secondly, all three countries saw the emergence of a well-organized labour movements in the 1880s; this can be expected to have enhanced the bargaining position of labour and therefore also wages in relation to GDP.

To sum up, the factors that I expect should influence the ratio of wage growth to GDP growth are price developments, population



**Fig. 1.** Wage growth minus GDP/c growth in Denmark 1818–1910 (7 year averages). *Note.* Source: daily wages from Khaustova and Sharp (2014: A.3), kroner per day. GDP (*bruttofaktorindkomster*) from Hansen (1974: Table 3, 217–8). Population from Hansen (1974: Table 1, 201).

growth, emigration, and institutional factors.<sup>1</sup> I now turn to the empirical evaluation.

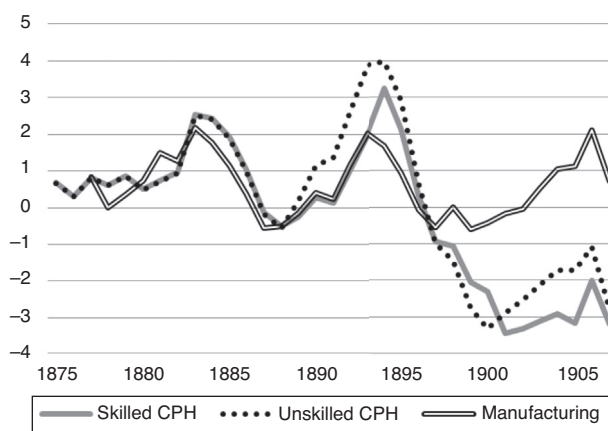
#### 4. Wages and GDP 1800–1910

##### 4.1. Denmark

Fig. 1 shows wage growth less GDP/capita growth (in seven year averages) for male agricultural labourers, male urban workers and masons from 1818 to 1910.

Urban workers had a much better wage development than rural workers. The average annual money wage growth for rural workers 1818–1910 was 1.2%, and for urban workers 1.9% (masons 1830–1910 1.2%). Especially before 1880 it seems that rural workers were left behind while urban workers' wages in relation to GDP were quite volatile, but over the longer run performed quite well. Urban wages grew faster than GDP in the early 1820s, which was a period of heavy deflation after hyper-inflation, state bankruptcy and monetary reform in the 1810s (Hansen, 1972 ch. 4, Olsen, 1962 ch. 5, Abildgren, 2009). Real wages fell in the 1810s. That they rebounded in the heavy deflation of the early 1820s is not surprising, given that Flinn (1974) finds very much the same thing for Britain in the 1810s and 1820s. However, we must remember that the deflationary period also meant increasing unemployment which hit the working class, so net the “positive real wage” performance of those years does probably not mean that working class living standards overall rose. In the strong economy of the 1840s urban wages actually outpaced GDP, but there is a negative bounce back in the 1850s, so that no net gain was made. The 1870s and 1880s show a more lasting period of urban wage growth outpacing GDP growth, and this time it is also true for rural workers: it thus seems that the working class made advances here. Wage-GDP ratios are dragged down in the 1890s, but not as much as for rural workers.

For rural workers, wages lagged GDP for most of the period from the mid-1820s to 1870. The only period between 1818 and 1910 where agricultural wages grew faster than GDP was c. 1870–1890. For the post-1870 period I also have series for unskilled and skilled



**Fig. 2.** Wage growth minus GDP/c growth in Denmark, 1872–1910 (7 year averages). *Note.* GDP per capita calculated with Hansen's (1974: Table 3) GDP estimates, also represented in Abildgren (2008: Table A.5) and Hansen's (1974: Table 1) population estimates. Manufacturing wage from Abildgren (2008: Table 1A), series “Annual growth in nominal hourly earnings in industry 1875–2007”. Other two series from Dalgaard (1926), only available for certain years; I have linearly interpolated between those years.

workers in Copenhagen, and manufacturing workers in the country. These are shown in Fig. 2.

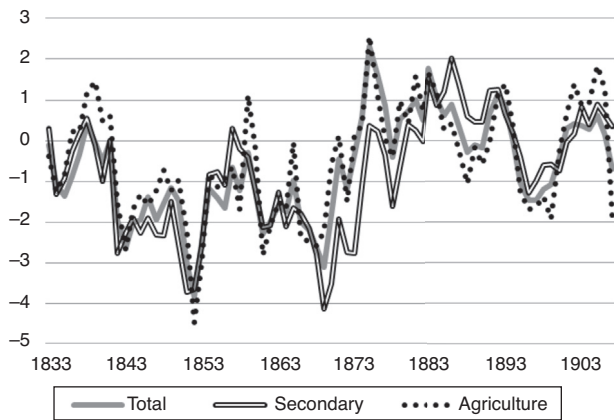
These wages grew faster than GDP from the early 1870s to the mid-1890s, which given what we have seen in Fig. 1 is not surprising. The Copenhagen crafts workers fell behind in the first ten years of the twentieth century, while the favourable development continued manufacturing workers, with only a small blip of weak wage growth around 1900. Olsen (1962) and Abildgren, 2008 see more or less constant wage shares from 1875 to 1910. Just like we have seen in Fig. 1 especially for rural workers, performance of wages relative to GDP was stronger in the 1870s and 1880s than in the 1890s and 1900s (cf. Pedersen, 1930, p. 17). It seems then that the falling behind for rural workers and urban crafts workers in the 1890s and 1900s partially reversed the advances of workers in the 1870s and 1880s. However, the overall impression is that from the 1870s income developments were on the whole more positive than for the population at large and that, if all the evidence is considered, there was probably a slight rise in the wage share from 1875 to 1910, rather than stagnation. This is in a sense surprising given that Denmark did not have major emigration in the period, and the favourable trend for workers began in the 1870s, not the 1880s when the labour movement gained a permanent foothold. We will come back to these factors after inspecting the Norwegian and Swedish cases.

##### 4.2. Norway

Fig. 3 shows wage growth less GDP per capita growth from 1830 to 1910, for industry, agriculture and the average throughout the economy. In 1830, when the data start, real wages were at a rather low level: in 1820 they had been at the same level as a hundred years earlier; real wages had had a 18th century peak in 1791 and seen a steep fall since 1799 (Eitrheim et al., 2007, p. 398; cf. Boje, 1986, p. 74). Although real wages grew in the 1820s, they were probably not at an out of equilibrium high at our starting point in 1830 (cf. Minde and Ramstad, 1986). Nevertheless, Fig. 3 shows that in the 1840s, 1850s and 1860s GDP per grew a lot faster than wages did. Workers' decline in relative terms seems to have lasted until c. 1875; from then until 1892, wages grew faster than GDP.

Why was there such a disconnect between wages and GDP growth in the 1840s, 1850s and 1860s? The finding that workers

<sup>1</sup> We might ask whether technological change during the industrial revolution was skill-biased (see O'Rourke et al., 2013). I however have no data for this for Scandinavia, and no previous research to build on, and so this factor is left by the wayside here. There is ongoing research on the technology-skill-wage nexus in Norwegian industry from the 1860s on (Modalsli and Leknes, 2017), but it demands different types of data than the ones used here.

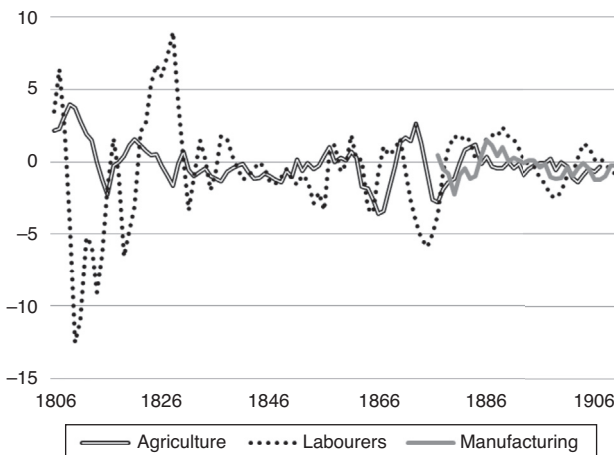


**Fig. 3.** Wage growth minus GDP/c growth in Norway 1830–1910 (7 year averages). Note. GDP is from Grytten (2004b) Table 5 GDP per capita in NOK. Wage is from Grytten (2009) Appendix 1 “Nominal wages per man-year for Norway, 1726–2006, in NOK”.

lost out c. 1840–1870 stands in sharp contrast to claims that the Norwegian nineteenth century gave no support for a “pessimist” interpretation where the living standards of workers did not grow at a pace with general living standards (Minde and Ramstad, 1986; Myhre, 1986). But conforms well to emphasis on proletarianization in the mid-nineteenth century (Sejersted, 1993, pp. 57, 95–97). It also conforms well to the fact that inflation was rather high especially in the 1850s at 3% a year, while nominal wages only grew 2.2% a year (Grytten, 2004a; Grytten, 2007). Real wages for manufacturing workers and servants continued to stagnate during the 1860s, and only started a new increasing trend in the mid-1870s (Hodne and Grytten, 2000, p. 284). From 1840 to 1870 real wages increased by 9% but GDP per capita in real terms by 37% (calculated from data in Grytten 2004, 2009). Both the workers’ lag from the 1840s to the 1860s and the strong development of wages in the 1870s and 1880s are similar in Norway and Denmark.

#### 4.3. Sweden

Fig. 4 presents wage growth less GDP growth for agricultural workers 1803–60, labourers in Stockholm 1800–1910, and



**Fig. 4.** Wage growth less GDP/c growth in Sweden 1800–1910 (7 year averages). Note. Wages for male agricultural workers 1803–1914 are from Jörberg (1972), an unweighted average of the 24 counties. Labourer wages in Stockholm are from Söderberg (2010) for 1800–64 and from Sociala Meddelanden (1927) for 1866–1912. Wages for male manufacturing workers 1871–1920 from Prado (2010b). GDP per capita is from Edvinsson (2005), the series “GDP per capita by expenditure in purchasers’ prices (SEK), nominal value”.

manufacturing workers 1860–1910. Real wages were at a historically low level the years around 1800. Real wages had fallen during the eighteenth century, which was a century of rapid population growth (Jörberg, 1972, pp. 335–6; Söderberg, 2010, p. 470; Edvinsson and Söderberg, 2011, p. 267). In other words, as in Norway, wages are at a rather low level when the period of investigation starts.

Agricultural wages increased faster than GDP in the 1800s and 1810s. Then, however, a weaker period for wages ensues. For both agricultural labourers and Stockholm labourers, wage growth lagged GDP growth from the mid-1820s to the 1850s, rather similar to what we have seen in Denmark and Norway. The negative development of this period is ironic given that Olsson (1986, p. 157) found falling living standards c. 1780–1820 and then a positive turnaround on many indicators such as real wages, diet and mortality. This indicates that the working class loss 1825–1855 shown in Fig. 4 is more an indicator of rapid GDP growth than of weak wage growth.

In the 1870s and 1880s wage growth shows a slight surplus above GDP growth. The positive development of wages in the 1880s is well-known in Swedish research (Schön, 2004, p. 36; Söderberg, 2010, pp. 464, 470). However the finding contrasts with Jörberg’s (1973) claim that the 1870s would see faster increases of profits than wages. During the 1890s and 1900s, wages grew slightly slower than GDP (cf. Prado, 2010a, p. 195). Given the large outflows of labour to the United States in the 1880s and 1890s as well as the increasing organization of workers in trade unions, this is surprising.

#### 4.4. A comparative perspective. What happened to working class living standards in Scandinavia?

Table 3 sums up the development of the wage–GDP ratio period for period for our three countries. The 1840s, 1850s and 1860s were decades when wages fell behind GDP; the only exception is Danish urban workers in the 1840s. In the 1880s, on the other hand, wages grew faster than GDP in all three countries.<sup>2</sup>

Why did wages lag GDP growth in all three countries in the 1840s, 1850s and 1860s? This result is in line with the research which has analyzed this period as one of capitalist polarization in the countryside, with a rapidly growing underclass of proletarian and semi-proletarian groups. This image is well-established in Danish (Hansen, 1972, p. 134; Hyldtoft, 1999, p. 122) as well as Norwegian (Sejersted, 1993; Pryser, 1993) and Swedish (Utterström, 1957, p. 43; Lundsjö, 1975, p. 163; Martinus, 1977, pp. 30–34) historiography. Danish population growth was not as rapid as that of its neighbours, but wages lagged as much there, which indicates that inequality increased as much there. That rural workers’ wages stagnated relative to GDP in Denmark in this period is also surprising as Danish economic growth in the nineteenth century really was led by highly efficient agriculture (cf. Hansen, 1972, pp. 23, 32). Denmark is in both these ways an unlikely case for wages lagging GDP growth in the mid-nineteenth century, but nevertheless this is what happened. This indicates that social polarization and proletarianization had major effects on inequality even though population growth varied among the countries. Wages did not grow in time with GDP, and workers lost out as their wages also lagged land prices (Martinus, 1977), which made it more difficult for a

<sup>2</sup> These results accord with the development of food real wages. I have calculated such real wages by deflating the agricultural wage series used here by the market prices of grain, beef and butter. By this measure, all three countries show stagnating real wages from the 1820s to the mid-1870s. After 1875 Norway and Sweden show an improving trend, while data for Denmark are missing. Calculations available from the author upon request.

**Table 3**  
Average annual wage growth less GDP growth 1800–1910.

		1800s	1810s	1820s	1830s	1840s	1850s	60s	70s	80s	90s	00s
Denmark	Rural			-2.7	2.8	-2.0	-2.0	-0.2	1.3	0.9	-2.1	0.3
	Urban			0.4	-1.4	4.8	-0.3	-1.4	3.7	-0.5	-0.5	-1.3
	Manufacturing								-0.5	-0.2	-0.6	0.5
Norway	Agriculture				0.1	-0.6	-2.2	-1.5	0.1	0.3	-0.5	0.6
	Manufacturing				-0.3	-0.9	-2.4	-1.4	-2.0	1.0	-0.7	0.8
Sweden	Agriculture	2.1	0.4	0.9	-0.9	-0.5	-0.3	-2.3	0.3	0.5	0.1	-1.2
	Urban	-2.1	-3.3	5.9	-1.0	-0.4	-1.3	0.1	-2.0	1.0	-1.7	0.4
	Manufacturing								-0.7	0.5	-0.5	-0.4

proletarian to save money to buy land. This in itself made the wage-earning class more self-sustaining after the mid-nineteenth century, as children of workers were very unlikely to become self-owning farmers.

The finding that the wage-to-GDP growth ratio was favourable from the 1870s on contrasts with *Jörberg's* (1973, p. 452) claim that increasing export demand in Norway and Sweden in the 1870s increased incomes but with the large labour supply holding down wages, mostly incomes for companies. Here on the contrary the 1870s seems a turning point to a favourable wage development in both Norway and Sweden. *Eitrheim et al.* (2007, p. 395) have claimed that much of the real wage growth in the 1870s and 1880s was due to deflation. However, deflation was not as heavy in this period as one might expect from the well-known “grain invasion” of the 1870s. In the 1870s on average the Norwegian consumer price index actually grew a little, 0.5% a year, in the 1880s prices fell but only by -0.5% per year, and in the 1890 prices stood rather still, with an average yearly decrease of -0.02% (calculated from *Grytten, 2004a*). From this, it does not seem that deflation was the driver of the strong performance of wages relative to GDP in the 1870s and 1880s. Rather, it seems that emigration made a difference, as in *Ljungberg's* (1997) study of Sweden. We should however also keep in mind that as a whole, the period 1875–1910 does not show as much of an advantage of wages over GDP as GDP had over wages in the 1840–1875 period.

#### 4.5. Limitations of the analysis

There are three serious limitations of the analysis, in the sense that information on three important issues have been left out. Firstly, variations in employment intensity. Could it be that periods marked by wages lagging GDP, as measured here, were combined with increased employment, and conversely? That would cause problems for the drawing of conclusions on working class living standards and inequality based on the empirical investigation of this paper. There is very little aggregate information that can be used to resolve this issue. But for Sweden, there is at least one measure that can be used as a proxy for unemployment throughout the period: the number of people receiving poor relief (*Statistiska Centralbyrån 1914*, Table 127). This measure does not show any particular trend over time, and does not vary in any obvious way with the wage-to-GDP-ratio used in this paper. poor relief. The lowest poor relief share of the nineteenth century was in 1845, below 3%, and the local peaks were in 1830, 1870 and 1895. In sum, these variations in the acutely poor seem to follow a different rhythm than the wage-to-GDP-ratio, and thus at least do not undermine the conclusions drawn here. Furthermore, *Lundsjö* (1975, pp. 167–169) in his investigation of nineteenth century rural poverty in Sweden, using incapacity to pay any taxes as measure of poverty, found underemployment and poverty in the rural sector especially in the 1850s. This would serve to strengthen the finding of this paper, of a particularly negative development for wage labourers in the mid-nineteenth century.

Another issue on which the present data is silent is that of children's work. Children's work could play a very important role in the upkeep of working class families during industrialization (e.g. *Schwarz, 1992; Horrell and Humphries, 1995*). While the wage data included here do not include children, we may note that the legislation against child labour in factories came in 1873 in Denmark, 1881 in Sweden, and 1891 in Norway (*De Coninck-Smith, 1997*, p. 130; *Schrumpf, 1997*, p. 9; *Olsson, 1980; Sandin, 1997*). These laws restricted the working time for children (under the age of ten in the Danish case, fourteen in the Swedish), and the Swedish law even banned children under twelve years from working in factories (*Olsson, 1980, Sandin, 1997*). While the explanations of the reforms differ from technological progress making child labour unprofitable, to growing educational ambitions for children, what is important in the context of this paper is that the reforms came 1873 and later. Thus, working class families' dependence on the adults' labour increased in this period when their wages grew rather healthily. The purchasing power of working class families might not have grown as much as the wages studied in this paper did, but given that children's time for education and leisure grew at the same time, living standards did improve in the post-1870 period.

A third important factor is the interplay between access to land, and wages. With less access to land for the lower classes, dependency on wage labour intensified (e.g. *Humphries, 1990*). I can here only relate two developments which decreased workers' access to land in Scandinavia during the period of investigation. One, the evictions of crofters and tenant farmers by estate owners in Denmark and Sweden. Two, that the price of agricultural land grew very rapidly, as population grew and domestic as well as external demand for food increased. In Sweden, the price of land grew by 377% from 1800 to 1850 while the CPI only grew by 146%; from 1850 to 1900 the difference was even bigger as land prices grew by 303% and the CPI by 29% (*Bengtsson et al., 2017*, Table 5). This meant that it became more difficult even for farmers' children to afford to buy farms, and aggravated proletarianization. Both these developments which decreased the access to land occurred over the nineteenth century, but especially during the second half. This should serve to temper somewhat the conclusions of this paper of a strengthened position of the working class after 1870. Wages did grow faster after 1870 and more at a pace with general incomes, but wage-earning families also became more and more dependent upon those wages.

## 5. Conclusions

The experience of a hollowing out of wages in relation to GDP during the 1840s, 50s and 60s in the Scandinavian countries, despite their differences in economic structure, rhymes well with *Hobsbawm's* (1975) labelling of the period from 1848 to 1875 as the “Age of Capital”, the period during which the hegemony of capital ruled without being seriously challenged. Recently, *Margo* (2000) for the US, *Allen* (2009) for Britain, and *Piketty* (2014, pp. 8ff, 224ff)

for France have found 1870 to be a turning point between growing capital share and growing wage share; the investigation here shows the same thing in Norway and, partly, Denmark and Sweden: an “Engels’ Pause” of stagnating working class living standards amidst economic growth.

In terms of explanation of why wages lost out in relation to GDP between 1840 and 1875, monetary factors might not have been as important as could be expected from previous literature (Eitrheim et al. 2007: 395; Grytten, 2009; also the international literature: Flinn, 1974; Lindert, 1985). There was less deflation in the 1880s than we might expect from the common picture of the early Gold Standard era. The importance for inequality of surplus labour with population growth and proletarianization, on the other hand, is supported by the present investigation. When the labour movement grew in all three Scandinavian countries in the 1880s, Norway and Sweden which had major emigration but not Denmark with less emigration experienced rapid wage-to-GDP-growth. From this it would seem that the emigration shock to labour supply (only seen in Norway and Sweden) was more important for wages in the 1880s than the institutional effect of growing trade unionism (seen in all three countries). This is consistent with Gustafsson’s (1965) conclusion of non-effects of unionism on wages in the Swedish saw mill industry before 1910, and in the Danish case with Olsen’s (1962: 191) agnostic position that it is hard to tell whether unions made a difference for wages between 1870 and 1910. Given that it has been shown that after 1910, for example during the wave of labour militancy at the end of the 1910s, trade unions did exert positive effects on wages (i.e. Bengtsson, 2014 on Sweden), it is plausible that there was a sea shift in the functioning of wage setting in Scandinavia around 1910. Trade unions were recognized as bargaining partners by employers’ associations in Denmark in 1899 and Sweden in 1906, and the era of income equalization and working class strength was on its way when this paper ends in 1910 (cf. Piketty, 2014). Similarly, the social upheaval of 1848 and political reforms in Denmark post-1848 seem to have had no positive effect on wages, at least not in the short term. Actually, agricultural wages in Denmark after the reforms of 1848–51 performed very badly. They rebounded c. 1855–65, but in direct connection to the reform period, that widely is seen as strengthening the popular classes, we see no positive effect. In summary, variations in labour supply was the most important determinant of trends in the wage-to-GDP-ratio in nineteenth century Scandinavia.

There are some obvious limitations of the present investigation when it comes to adjudging the development of the relative living standards of the working class in Scandinavia from 1800 to 1910. I have discussed especially three limitations: employment intensity, the household economy and the role of children’s labour, and access to land. This invites a reflection on the theme of this special issue, on new approaches to the economic history of Europe. Because, I will argue, the limitations of the analysis point to some routes forward for research into working class living standards and inequality in the pre-industrial and industrializing periods. This paper is made possible by the large contributions to the macroeconomic history of Scandinavia in the last fifteen years by researchers such as Abildgren (2008, 2009, 2017), Edvinsson (2005), and Söderberg (2010), Eitrheim et al. (2007), Grytten (2004a, 2004b) and Prado (2010a, 2010b), and Schön and Krantz (2015). These researchers and others have made great strides in enlightening Scandinavian economic history, relating to precursors such as Hansen (1972, 1974) and Jörberg (1972). The upswing for quantitative macroeconomic history in this period is of course not unique to Scandinavia, even though the trend might be even more pronounced there. The new knowledge into the movements of variables such as wages, prices and GDP are invaluable. However, the many caveats that have been included in this paper of the limitations of the analysis built on macro data for understanding

the development of living standards and inequality, is, I believe, an indicator of a wider phenomenon. That is, the need for more fine-grained micro analysis to combine with the macro data.

The wave of social history in the 1970s and 1980s provided path-breaking studies of proletarianization (Winberg, 1975), poverty (Lundsjö, 1975), work time (Cornell, 1982), child labour (Olsson, 1980; Schrupf, 1997) and other issues. The design of these studies was to study a local area, such as a couple of parishes, or two or three factories. There is now a need to combine the national and comparative perspective of the new macro studies, with the empirical sophistication of the previous micro history, to come further in understanding the living conditions of the working class during the nineteenth century. Not the least the dearth of Scandinavian studies of the working-class household economy is striking, even though Nilsson (2015) provides a new micro study of this issue in the context of industrial home workers. For all three limitations pointed to in the context of the present investigation, I believe that the best way forward is a micro approach. For employment intensity, we are most likely to find useful information on the local level. For Sweden for example Gustafsson (1965) in his study of saw mill workers from 1860 to 1890 explicated on the joined development of wages and working hours. Gustafsson’s as well as Cornell’s (1982) study on the same workers group show how local intense archival studies can provide new information on employment intensity which is impossible to measure on the macro level. The second discussed limitation is the lack of information here about how families and households combined labour of men, women and children to get by. As far as this author is aware, the Scandinavian countries offer no pre-1900 household budgets such as those used by Horrell and Humphries (1992) to study working class living standards in Britain 1787–1865. New archival work is needed to further our knowledge of the working-class household economy and the trade-off between men’s, women’s and children’s labour (i.e. Nilsson, 2015). The same goes for the third limitation, the issue of access to land. It has been pointed out (Section 2) that the vast majority of the population of Scandinavia in the nineteenth century was rural. To really understand the shifting fates of workers and their living standards in this period, we need new research on the nexus of access to land, dependence on wages, and the development of wages (as in Lundh and Olsson, 2011).

To sum up, the empirical investigation of this paper yields a view of the Scandinavian working class’ living standards in the nineteenth century as follows. In the three middle decades of the century, among healthy economic growth, rapid population growth and proletarianization, workers did not take part of the growing incomes. After the beginning of the 1870s, the picture is more mixed, with clear increases in the real wages, and wages growing about at the same pace as GDP until 1910.

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