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Workers' share of growing income

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Inequality and the working class in Scandinavia 1800 to 1910

Workers' share of growing incomes[1]

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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 especially in Norway from 1840 to the mid-1870s but also in Denmark in the 1850s and 1860s. On the other hand, wages generally increase faster than GDP in the 1880s and 1890s. These developments are explained with labour supply (population growth, migration) as well as class conflict and social policy.

Keywords: Wages, living standards, inequality, working class, Denmark, Norway, Sweden

JEL codes: E24, I30, J30, N13, N33

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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 rapidly. This wage lag means that the increased wealth has accrued to other groups than ordinary workers, namely the upper middle class, top management and owners of capital, and that inequality has increased (Bivens et al 2014; cf. Piketty 2014). Within economic history, the relationship between wages and GDP is a classical issue, especially for the debate on the living standards of the working class during industrialization and at which point workers started benefitting from the increased economic growth associated with industrialization. Feinstein (1998: 652) writes that: "Most British workers and their families did not experience an actual deterioration in their standard of living during and after the Industrial Revolution. But neither did they enjoy the rapid progress which the super-optimists have discerned. For the majority of the working class the historical reality was that they had to endure almost a century of hard toil with little or no advance from a low base before they really began to share in any of the benefits of the economic transformation they had helped to create." This is a statement on inequality, on how the working class lags behind overall living standard.

This paper investigates the relationship between wage growth and GDP growth in Scandinavia c. 1800 to 1910. The first task of the paper is descriptive, establishing when workers' wages rose in line with average incomes, when they rose faster and when they rose slower. The second task is analytical: to clarify which factors affect the wages–GDP gap. Hypotheses are drawn from the literature and focus on prices, labour force growth, emigration and working class activism. The period 1800 to 1910 covers the main industrialization period of Scandinavia, giving us the opportunity to look at how the living standards of the working class were affected by industrialization, just like in the British debate (e.g. Feinstein 1998, Allen 2009).

The paper is structured as follows. Section 2 discusses the wage-GDP ratio as an indicator of inequality. Section 3 discusses methodology. Section 4 discusses independent variables and hypotheses, and the data used. Section 5 presents the results. Section 6 calculates real food wages to investigate the evolution of workers' living standards, and section 7 concludes.

2. Wages, workers' living standards and inequality in the 19th century

One of the most important social cleavages in capitalist society is that between employer and employee, worker and owner of capital. In the industrializing economy this is the most relevant distributional split; most of the (urban) population can be neatly divided into capitalists and proletarians, where one group has capital incomes and the other labour incomes, and the social differences between the two groups are large (Prados de la Escosura 2008: 290). As the economy becomes more sophisticated, education levels among workers rise and human capital plays a larger role for income determination, the group of employees becomes more heterogeneous and differences between workers becomes more important for income inequality. But as Piketty (2014: ch. 7) recently has argued, while the inequality of labor income is a very important part of income inequality today, it is an empirical fact that capital incomes are much more unequally distributed and hence if capital incomes increase faster than labour incomes do, then overall income inequality increases.

For the period after c. 1900, national accounts data can be used to study the distribution between capital and labour (i.e. Bengtsson 2014 on Sweden), but for the earlier period national accounts are typically not sufficiently detailed and reliable. [2] Instead, the relationship between wage growth and GDP growth is a relevant measure: GDP growth is roughly equivalent to average income growth, so if GDP growth is higher than wage growth, then it means that other types of incomes grow faster than wages do, which implies an increase of inequality since wage labourers are the lowest income group in the economy. This type of measure has a rich and varied history within economics and economic history. Phelps Brown and Hopkins (1950) sixty years ago used the labourer wage to average income ratio as their inequality measure in a study of five countries 1860–1939, and recently economic historians have used the same approach (Greasley et al 2000) as well as related approaches, such as directly comparing labourer wages to land rents, as an indicator of agrarian capitalists' incomes (O'Rourke and Williamson 1994). Furthermore, of course in the classical debate on the standard of living during the Industrial Revolution, implicitly the same approach was used, as growth in workers' incomes (wages) is compared to growth in average income (GDP) (e.g. Feinstein 1998, Allen 2009). In sum, the relationship between wages and other, more

[2] For example the wage sum might be calculated from limited information: Abildgren (2008) presents wage shares for Denmark back to 1875 but before 1920 they are only based on manufacturing wages. For Sweden before the mid-1870s existing wage share calculations lack data on the important sawmill sector. And employment is often only available for census years. For discussion on historical wage and capital share data for 19 countries, see Bengtsson and Waldenström (2015).

unequally distributed types of incomes (land rents, profits) or average incomes (as proxied by GDP) is a relevant measure of income inequality and a helpful tool for understanding the relative living standards of the working class. To strengthen the latter part, I will also use real wages, in the shape of money wages related to food prices, to investigate how the living standards of workers develop in absolute and not only relative terms.

3. Data

Most of the research on Scandinavian wages in the 19th century has been concerned with creating wage series. For Denmark, Khaustova and Sharp (2014) recently have published wage series for rural and urban labourers as well as masons back to 1732; here I will use data back to 1818, when the GDP data (from Hansen 1974) begin. [3] To complement these data, I will also use Dalgaard's (1926) wages for skilled (*svende*, journeymen) and unskilled (*arbejdsmænd*) urban workers starting in 1872, and the manufacturing worker wages from 1875 on constructed by Christensen (1975) and recently updated by Abildgren (2008). All studies mentioned above are concerned with establishing wage series as a measure of living standards, not to relate them to living standards of other groups or look at inequality. I will use the data for these latter purposes.

For Norway there are unusually good sources for wages for different sectors all the way back to 1726, building on the uniquely rich Wederwang Archive. The data are presented in Grytten (2007, 2009) and are the wage data that I will use here; they cover all sectors of the economy, and I will use data for agricultural workers, manufacturing workers, and the series for the economy overall. There are also other previous studies of working class living standards, but none of these two studies relate wages to GDP per capita or to the living standards of other social groups, which again is what I am interested in: Kiel and Mjøset (1990) relate money wage developments in Norwegian industry 1840–1985 to changes in cost of living, and Minde and Ramstad (1986) is an earlier study using the Wederwang Archive, covering the 1730–1910 period.

For Sweden, the first long run wage series was the one for agricultural workers constructed by Jörberg (1972). However, he does not at all discuss productivity increases as a

[3] Hansen (1974: Table 20, p. 298) has produced a wage series for urban workers 1818 to 1870. It builds on eight wage series for various groups of workers (carpenters, metal workers, etc) in Copenhagen and other cities Hansen's estimates have been criticized for overestimating the rise in workers' living standards especially in the 1850s and 1860s (Christensen 1992, Hyldtoft 1994). However much of this critique depends on the consumer price deflator used by Hansen that is not used here. Christensen (1992) also presents alternative data for 1840–1870. However they are not publicly available.

source of wage increases, and does not discuss distribution issues. Söderberg (1985, 1987, 2010) has a long run urban labourer wage series for Stockholm 1540 to 1850. I will use both Jörberg's and Söderberg's series. The Söderberg one is completed with another series of labourers in Stockholm from 1860 onwards from Bengtsson and Prado (2014). From 1860 on I also use manufacturing worker wages, from Larsson (2007).

To sum up, for each country I have wages for agricultural and urban labourers as well as manufacturing workers separately. These will be related to GDP per capita estimates from Hansen (1974), Grytten (2004) 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. I make no such adjustments here.

4. Independent variables and hypotheses

In the 19th century, money wages were quite unilaterally set and inflexible in the short run, hence, fluctuations in real wages in the short run depended to a high degree on price changes rather than changes in money wages (cf. Flinn 1974: 379, Lindert 1985). Hanes (1993) claims for the US that modern real wage rigidity – nominal wages becoming more responsive to inflation – appears between the 1870s and the 1890s, caused by increased concentration in industry, larger work places, and working-class organization.[4] The Scandinavian countries were later developers than the US and modern real wage rigidity should have appeared here in the early 20th century; for example, 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, at least in the short run inflationary and deflationary episodes will affect the wage – GDP relationship.[5] 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

[4] In correspondence to this, Margo (2000) sees wages lagging behind prices in inflation episodes in the 1830s and 1850s in the US.

[5] Likewise, Heikkinen (1997: 113) shows that real wages in Finnish manufacturing 1860–1913 were countercyclical.

data in Grytten 2004a, Edvinsson and Söderberg 2011 and Abildgren 2009). From this I make the hypothesis:

- Hypothesis 1: wages will not keep up with GDP in the inflation of the 1840s and 1850s, but will not fall 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.

Recent economic history research on 19th century wages and the wage – GDP relationship has mainly worked within the neoclassical relative factor supply framework of O'Rourke and Williamson (1994), and focused on migration as a regulator of the labour-capital ratio. This factor supply focus can be generalized into focusing on what Marx called "the industrial reserve army" and Lewis (1954) theorized as "unlimited supply of labour": essentially, if there are, as in many times in the 19th century, 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 keep wage increases down. (cf. Allen 2009).[6] In a Scandinavian context Jörberg (1973: 452) has presented a similar analysis: after 1870 Swedish and Norwegian industry experienced greatly growing foreign demand at the same time as labour supply from less productive agriculture was great, which held down wages even in the presence of the export-induced increased demand for labour. This meant that profits increased; however, they were saved and invested. Only when the agricultural labour force "had fallen greatly" did wage pressure and the wage share increase, claims Jörberg. Rapid population growth has also been used to explain the fall in the real wages in Sweden in the 18th century; interestingly, one mechanism through which population growth lowered the real wage was, according to Söderberg (2010: 461–3), a positive effect on grain prices. As we will see below, it is for this period difficult to disentangle effects on real wages from population growth and prices. To enable discussion of the relation between population growth and wages, table 1 shows population growth per decade.

[6] On how difficult this is to measure in a good way, see Heikkinen (1997: 70–71).

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[7]	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.

Population growth looks particularly rapid from the 1820s to the 1850s and drops in the 1880s and 1890s in Norway and Sweden. Sweden and Norway both are marked in the early 19th century by decreasing mortality, possibly due to the classical three part explanation vaccines, peace and better nourishment through potatoes.[8] For Sweden, Winberg (1975) has stressed the growth of a proletariat in the countryside from 1750 to 1850 due to population growth outstripping land use growth; he finds in the agricultural population that the share who owned land decreased from ½ in 1750 to ¼ in 1850. For the Norwegian case, similarily Sejersted (1993: 67) locates the development of a proletariat on the bottom of society in the 1840s. (Also Pryser 1993: 328–9.) According to Sejersted, the over-supply of labour did not end until the great wage of emigration to the United States in the 1880s. Sandberg and Steckel (1988: 17) claim that from the 1840s to 1870s in Sweden ”the increased agricultural productivity was ending up in the hands of the relatively well to do”. Utterström (1957: 327, 347) in his classical work on agricultural workers claimed that real wages stagnated or fell in the 1830s and 1840s because of a combination of bad harvests and a growing proletarian labour force.

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 are the relevant expectation here, but rather wage effects 15 to 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 I make hypothesis 2:

[7] According to Schön and Krantz' (2015) data, average GDP per capita growth rate was 0.4 per cent in the 1820s, 0.67 per cent 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).

[8] Pryser (1993) supports this analysis for Norway while Nyström (1998: 234–5) criticizes it in a Swedish context. He points to that if mortality decreases because of peace, vaccines and potatoes, then it will in the agricultural context be difficult to get hold of a farm and correspondingly natality will decrease.

- Hypothesis 2: 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. For the Norwegian case Hypothesis 2 speaks against the claim of Minde and Ramstad (1986: 93, cf. Myhre 1986: 162) that the debate on workers' living standards during the industrial revolution, so prominent in the literature on Britain, was absent in the Norwegian case. According to Minde and Ramstad, in Norway for the 1850–1920 period there was no debate between "optimists" and "pessimists", but rather everyone agreed that the living standards of workers rose at a healthy pace. Minde and Ramstad (1986) claim that the debate on living standards in the 1730–1850 period was much livelier. I believe that there is still reason to open up the optimist versus pessimist debate for the second half of the 19th century.

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.

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

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

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.

- Hypothesis 3: in Norway and Sweden in the 1880s and 1890s, wages increase faster than GDP

Another type of explanatory variable is institutional and social factors. Feinstein (1998) stresses the labour supply factor and claims that his pessimistic evaluation of the fate of the British working class 1780 to 1830 is in line with the very large labour supply during the first half in the 19th century; he claims that in the 1850s there was a downward shift in this supply, when wages start increasing in line with GDP. But Feinstein (1998: 651) also explains this turning point with the large waves of working class activism from the 1810s to the 1840s. Relatedly, Naidu and Yuchtman (2013) show how repressive labour policies held down wages in 19th century Britain.

It is then worth to look also at labour movements and policies. One case is the Danish *husman* movement in the 1840s, which improved the lot of agricultural workers (*husmænd*) (Banggaard 2008: 294f). That the Danish ruling class was afraid of revolution in 1848 is lifted as an explanation of 1848–49 reforms in the literature (Bangaard 2008, Engberg 2011). Hyldtoft (1999:122) however has a more pessimistic evaluation of the lot of husmænd in the 1840s and 1850s; he claims that the peasant-farmers were doing fine with their increasing political clout (in the 40s they allied with urban liberals) and the export success of Danish grain in the 1840–1870 period, but that *husmænd* had the worst soil and had to work for money wages to survive, and that real wages were stagnant in the 1850s and 60s, as an indicator of over-population. Hyldtoft sees the 1850s and 60s as a period of capitalist class polarization in the Danish countryside, with a rapidly growing underclass of handicrafts workers (*håndværkere*) and agricultural workers (*husmænd*) on the one side, and increasingly affluent capitalist farmers on the other. Overall however the picture in the literature is one of real advance with the 1848 to 1851 reforms, including abolition of *corvée* labour (*hoveri*) and representational reform and an end to the absolutist rule, *envaeldet* (Olsen 1962: 51–54). The late 1840s – of course one of the major periods of social unrest in European history – also displayed working class militancy in Denmark (Hansen 1972: 136), unlike Denmark and Norway. Norway and Sweden saw relatively little popular unrest and none of the political advance that Denmark saw in 1848 (Berger and Spoerer 2001). Bull (1985: 23) sees the unrest

in Norway in 1848 as small compared to Denmark with its constitutional reform. We do see socialist movements like Thranebevegelsen in Norway (Pryser 1993: 326–331) and socialists like Götrek in Sweden (cf. Karlbom 1967: 116–134, 139; Utterström 1957: 344–9, 352ff) but no significant political achievements in this direction. On the other hand, Engberg (2011: 234-8) stresses that the 1848 period in Denmark saw no social policy reform and that about 1860 social policy directed to the poor actually took a turn to the more repressive.

The 1880s is the real breakthrough of the labour movements in Scandinavia. 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 in the 1880s (Sejersted 1993: 95f). In Denmark the local section of the Internationale was formed in 1871 and rapidly grew, but was defeated by state repression (Engberg 2011: 383ff). However, Hansen (1972: 250–2) claims 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. In Sweden the 1879 sawmill strike in Sundsvall was the first major strike in the country, and trade unions started forming in the 1880s (Heckscher 1941: 310). The historian Åmark (1986: 65) sees the 1870s as a "rather passive decade" but the 1880s as shaped by radical liberalism and generally increased political activity. He sees some power shift in favour of workers in the 1880s. From this history, I make two hypotheses:

- Hypothesis 4a: possibly a wage offensive in Denmark in the 1850s, post-reform
- Hypothesis 4b: wage offensive in the 1880s in all three countries

To sum up, the relevant independent variables should be monetary factors (H1), variations in labour supply due to population growth and migration (H2 and H3), as well as institutional and social factors (H4a and H4b).[9]

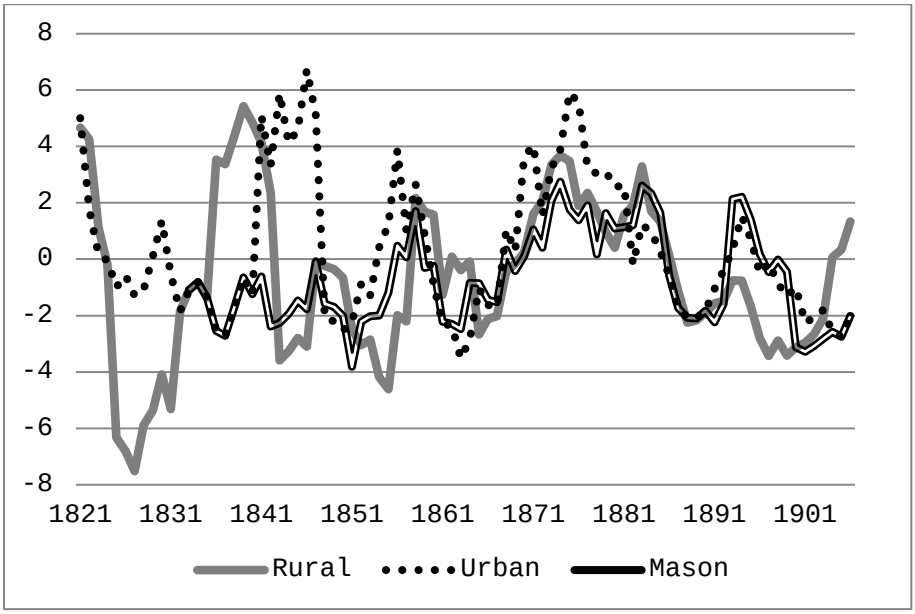
5. Wages and GDP 1800–1910

5.1 Denmark

Figure 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.

[9] Some authors stress the role of technological change, with an eye to the question of 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 and so this factor is left by the wayside here.

Figure 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. Originally from Christensen (1985). GDP (*bruttofaktorindkomster*) from Hansen (1974: table 3, 217–8). Population from Hansen (1974: table 1, 201).

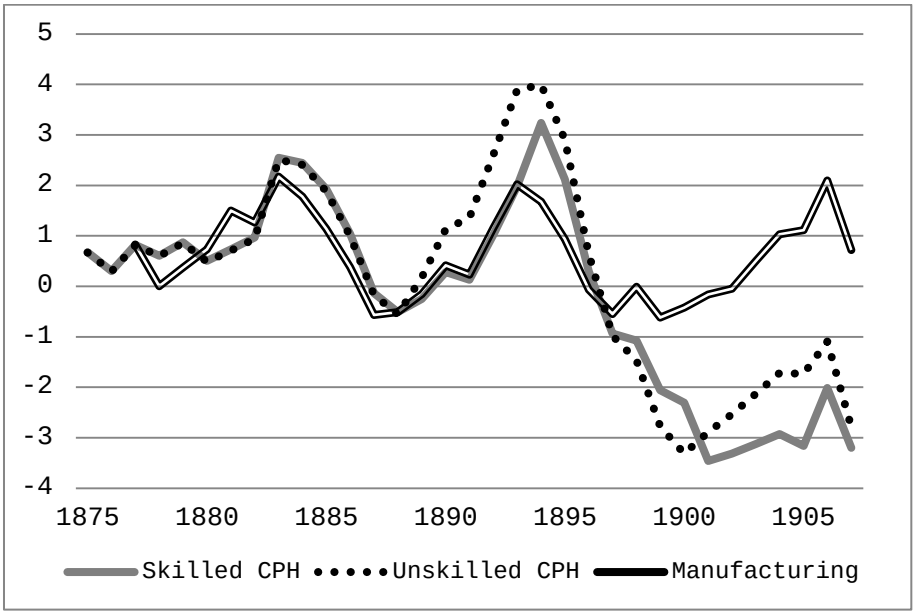
It is striking that urban workers seem to have had a much better wage development than rural workers. Indeed, the average annual money wage growth for rural workers 1818-1910 was 1.2 per cent, and for urban workers much higher: 1.9 per cent (masons 1830-1910 1.2 per cent). Especially before 1880 it seems 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. We see that 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 2010). We know that real wages fell in the 1810s and 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 outpace 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, the image of the 19th century is much more pessimistic than for urban workers. The wage-GDP relation looks terrible for most of the period from the end of the deflation of the early 1820s to 1870. The 1840s and 1850s was a period of capitalist polarization in the countryside, with a rapidly growing underclass of proletarian and semi-proletarian groups. That wages did not keep up with inflation sparked a major social policy debate on poor relief in the 1850s (Hansen 1972: 134), and we know that poverty in the countryside was increasing in the 1860s (Hyldtoft 1999: 122). The only period between 1818 and 1910 where agricultural wages increase above GDP growth is c. 1870–1890. Given the larger population growth of the mid-19th century and larger emigration of the post-1870 period in Norway and Sweden, I expected more negative and positive wage effects during those periods in those two countries (hypotheses 2 and 3), but it seems that Denmark conforms to the pattern expected for the two other countries. One possible explanation is the monetary factor (hypothesis 1), and it might also be the case that population growth and proletarianization in the mid-19th century was as important in Denmark as elsewhere.

For the post-1870 period I also have series for unskilled and skilled workers in Copenhagen, and manufacturing workers in the country. These are shown in Figure 2.

Figure 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 A.1), 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.

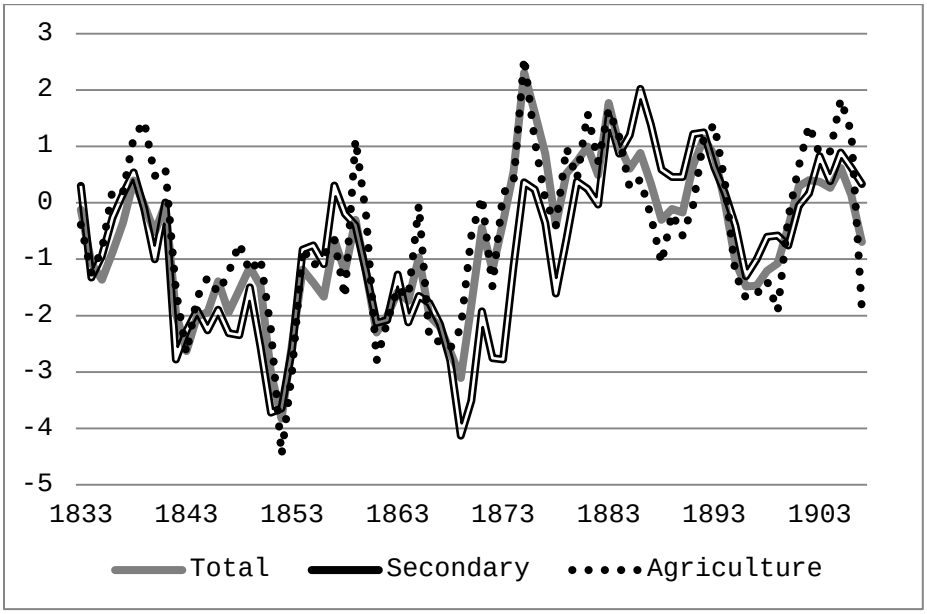
These wages grew faster than GDP from the early 1870s to the mid-1890s, which given what we have seen in Figure 1 is not surprising.[10] The Copenhagen crafts workers fell behind in the first ten years of the 20th century, while the favourable development continued manufacturing workers, with only a 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 Figure 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: 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 (hypothesis 3), and the favourable trend for workers began in the 1870s, not the 1880s when the labour movement gained a permanent foothold (hypothesis 4). Possibly the population growth factor is more important for Denmark than I expected, given the rural worker mid-century wage decoupling and the broad gains for workers after 1870. It could also be a case that there were international factors at play around 1870, given that Allen (2009) and Piketty (2014: 225) find the same break point in Britain and France from growing capital share to growing wage share, even though Britain and France were at a different stage of economic development than Scandinavia was.

5.2 Norway

Figure 3 shows wage growth less GDP p/c 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 (Eitrhem et al 2007: 398, cf. Boje 1986a: 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).

[10] The unskilled workers in Copenhagen do show a rapid increase in wages from 1870 to 1897: 63 per cent. This is also compatible with Pedersen's (1930) data for agricultural workers: the wage for a male agricultural worker (*karl*) increases by 63 per cent from 1856–60 to 1890–94 while GDP per capita increases by 50 per cent (in nominal terms), and from 1856–60 to 1916–20 the figures are 612 per cent and 468 per cent respectively.

Figure 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".

It seems that in the 1840s, 1850s and 1860s GDP per grew a lot faster than wages did, around 2 per cent faster per annum.[11] Workers' decline in relative terms seems to have lasted until c. 1875. It is notable that agricultural wages increased at pace with other wages in Norway, which they did not do in Denmark. Inflation was rather high especially in the 1850s at 3 per cent a year (Grytten 2004a) and nominal wages did not keep up, increasing 2.2 per cent a year (Grytten 2007). This rhymes well with Minde and Ramstad's (1986: 119) periodization where 1870 is seen as the point where the real wages for most groups of workers start an increasing trend. Hodne and Grytten (2000: 284) have also shown (with the same data as used here), without discussing the fact, that real wages for manufacturing workers and servants were stagnant in the 1850s and 1860s, and started a new increasing trend in the mid-1870s. There is in other words disconnect between wages and GDP in Norway from the 1840s to the mid-1870s. From 1840 to 1870 real wages (average of all sectors) increased by 9 per cent but GDP per capita in real terms by 37 per cent (calculated from data in Grytten 2004, 2009). This development is very much in line with hypotheses 1 and 2, that a large labour supply and price inflation in the 1840s and 1850s would cause wages to fall behind average incomes.

[11] For 1840–74 the average wage less GDP is for all sectors -1.15 and for industry -1.39. For the 1875–1910 period it is 0.09 and 0.16, meaning that wages grew a bit faster than GDP then.

The finding stands, however, in sharp contrast to Minde and Ramstad (1986) and Myhre's (1986) claims that there was no such thing in Norwegian history.[12] From the perspective of Sejersted (1993: 57, 95–97), however, who stresses the very rapid population growth from the 1820s on and the over-supply of proletarians from the 1840s on, the finding makes sense. Sejersted (1993) also stresses the rapid economic development from the 1840s on. The finding contrasts with Jörberg's (1973: 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 Norway.

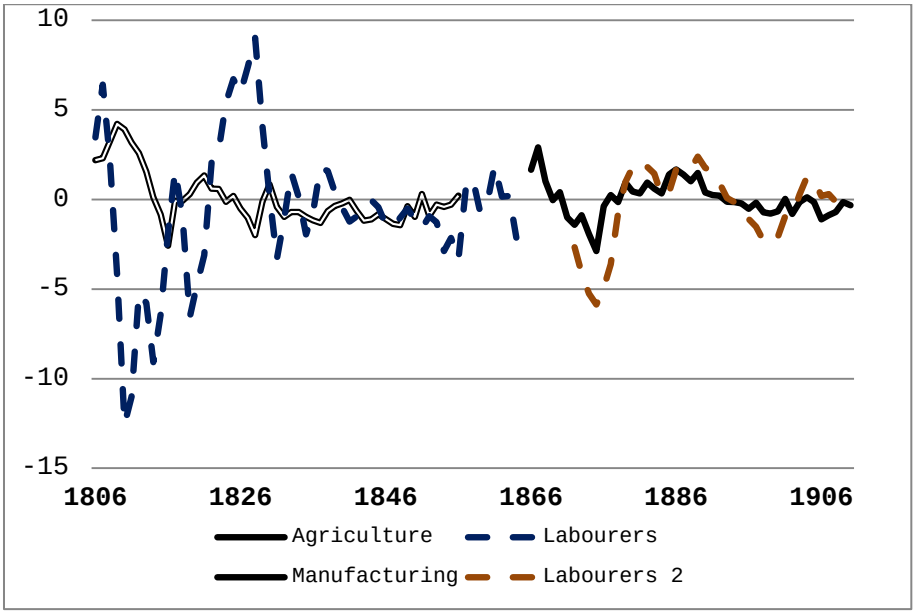
Because, from 1870 to 1892 the wage–GDP relationship changed and wages grew faster than GDP. The strong development of wages in the 1870s and 1880s is similar to what happened in Denmark, as seen above. Eitrheim et al (2007: 395) have also noted the strong real wage growth in the 1870s, 1880s and early 1890s, however without relating it to GDP or the incomes of other groups. They claim that much of the real wage growth 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 consumer price index actually grew a little, 0.5 percent a year, in the 1880s prices fell but only by -0.5 per cent per year, and in the 1890s average change in the consumer price index is -0.02 (calculated from Grytten 2004a). From this, I do not believe that deflation was the driver of the strong performance of wages relative to GDP in the 1870s and 1880s. As we have seen, there was a "small wave of class struggle" in Norway in the 1870s, and the labour movement was consolidated in the 1880s. At the same time, of course, emigration to the United States peaked in the 1880s, decreasing the labour supply and downward pressure on Norwegian wages. Teasing out which variable was more important – emigration, class mobilization or something else – is, however, very hard. But I do believe that the behaviour of prices is not enough to explain the turnaround of the 1870s.

5.3 Sweden

Figure 4 presents wage growth less GDP growth for agricultural workers 1803–60, labourers in Stockholm 1800–1864 and 1866–1910, and manufacturing workers 1860–1910.

[12] But Grytten (2009: 64) sees it. He gives three explanations. One, that families were smaller so that fewer persons had to live off one man's wage. Two, a reduction in working hours. Three, nominal wage rigidity.

Figure 4. Wage growth less GDP/c growth in Sweden 1800-1910 (7 year averages)



Note. Wages for male agricultural workers 1803–1859 and for male and female manufacturing workers 1860–1910 from Larsson (2007). The agricultural data are originally from Jörberg. Labourers in Stockholm 1800–1864 comes from Söderberg (2010). Labourers in Stockholm 1866– as in Bengtsson and Prado (2014). GDP per capita is from Edvinsson (2005), change in the series "GDP per capita by expenditure in purchasers' prices (SEK), nominal value".

Real wages were at a historically low level the years around 1800 (Jörberg 1972: 335–6, Söderberg 2010: 470); real wages had fallen during the 18th century with high population growth (Edvinsson and Söderberg 2011: 267), similarly to Norway. From Figure 5, it seems that agricultural wages basically increased at the same pace as GDP per capita from 1800 to 1860. Given what we have seen for Denmark and Norway, where the incomes of rural workers fell behind average incomes in this period, this is surprising. One data problem that might explain the non-event of 1800–60 here is that the Swedish agricultural wage data build on publicly established market scales and not actually paid wages. Jörberg (1972) has concluded that the market scale prices and wages are useful, but one thing that we can assume is that they fluctuate less than the actually paid market wages. Thus, the agriculture series in Figure 5 could be misleadingly stable. However, in the long run the market scale prices should not be misleading, so the overall picture that agricultural wages in Sweden did increase at about the same pace as GDP per capita should hold. The average value of wage less GDP growth for 1803 to 1859 is 0.18, while for Denmark 1818–69 it is -0.38 and for Norway 1830 to 1869 it is -1.0.

However, this comparison may be misleading as the Swedish series begin earlier. We see that agricultural wages increased faster than GDP in the 1800s and 1810s. The

series for labourers in Stockholm is extremely volatile and hard to decipher. However, for both agriculture and Stockholm labourers we see a negative wage–GDP growth relation from the mid-1820s to the 1850s, rather similar to what we have seen in Denmark and Norway but not as quantitatively important. The negative development of this period is ironic given that Olsson (1986: 157) finds falling living standards ca 1780–1820 and then a positive turnaround on many indicators such as real wages, diet and mortality. This might imply that the working class loss 1825–1855 is more an indicator of rapid GDP growth than of weak wage growth. Heckscher and others have discussed a pauperization of the Swedish rural population in the mid-19th century and Sandberg and Steckel (1988) have found support for this thesis, using length data, for the 1840s to 1870s, but with wage data the negative development for proletarians (in relative terms) is found earlier than that. My finding is in line with Martinius' (1977) finding that while agricultural labourer wages (*dränglöner*) increased by 50 per cent 1830–60, land prices increased sixfold in the same period, i.e. a better development for land owners than for proletarians.

In the 1870s and 1880s wage growth shows a slight surplus above GDP growth. The positive development of wages in relation to GDP in the 1880s has been noted already by for example Schön (2004: 36). Söderberg (2010: 464, 470) observes the same process with real wage data, and attributes this development to industrialization gaining momentum. However the finding contrasts with Jörberg's (1973) claim that the 1870s would see faster increases of profits than wages. The 1890s and the first decade of the 20th century shows a negative wage-GDP-development (cf. Prado 2010a: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 a bit surprising. It is not, however, a wage-GDP-disconnect of the level of Norway from the 1840s to the 1870s.[13]

Table 3 sums up the development of the wage–GDP ratio period for period for our three countries.

[13] Can we see any pattern where the redistribution from wages to profits is followed by increased investments, as in Allen (2009)? In both Sweden and Norway the investment quota is higher in 1880–1900 (11.3 and 16.2) than in 1840–70 (7.9 and 11.9). However, the investment quota has an increasing trend overall in the 19th century so it's difficult to interpret the development. Hansen (1972: 238) claims that in the mid-1890s the Danish net investment quota shifted upwards to ten per cent from previous levels of 4-5 per cent, and explains this by merchants having accumulated capital and now taking an interest in industry. However, Hansen (1972: 228f) also explains the upswing in Danish industrial growth from the 1880s on with the high real wages of the period that increased demand for industrial products. Danish data only begin in 1876; they show a constant investment quota until 1891 and then a very steep increase, with a very high level ca 1898–1908.

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	2.2	0.2	0.9	-0.9	-0.5	-0.3					
	urban	-2.1	-3.3	5.6	-1.0	-0.4	-1.3					
	manufacturing								-0.1	0.9	-0.5	-0.3

The 1840s, 50s and 60s were decades were wages fell behind GDP slightly (Swedish agriculture) or more dramatically (Danish agriculture, Norway); the only exception is Danish urban workers in the 1840s. The period after 1870 gives a mixed picture, except the 1890s which is slightly negative for each wage series.

6. Real food wages

The best way to calculate working-class living standards for the 19th century in a way that makes international comparisons possible, is to calculate the real wage as the nominal wage related to the price of a reasonable consumer basket. This approach has been pioneered by Allen (2001) who proposes that a 19th century working-class family in Europe in a year needed to consume 182 kilograms of bread, 52 liters of beans or peas, 26 kilos of meat, 5.2 kilos of butter, a certain amount of linen, candles, lamp oil, fuel etc. to be able to have a "respectable" working-class lifestyle. Allen determines one "respectable" and one "sustainability" basket. This approach has also been applied to non-European countries, then naturally changing to reflect a reasonable estimate of what the working class in respective countries consumed: so the Turkish basket contains more rice, honey, lamp and chick peas than the British (Özmucur och Pamuk 2002), the Japanese one more soy beans and fish (Bassino and Ma 2006), and so on.

In Scandinavia, this approach has been used by Rönnbäck (2010) on Denmark 1715–1800 and Sweden 1732–1850, and Khaustova and Sharp (2014) on Denmark 1712–1913.[14] I would then want to extend it with Sweden 1850–1910 and Norway 1830–1910.

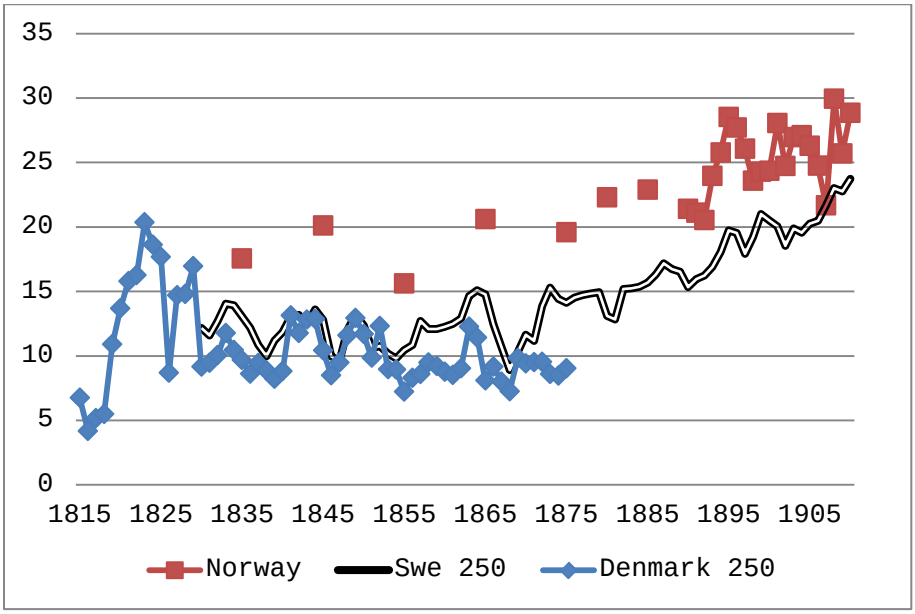
[14] In Denmark the subsistence ratio calculated by Khaustova and Sharp (2014) is below 1 at the end of the 1810s. It quickly rebounds and fluctuates between 1.5 and 2 during the 1820s, then increases linearly during the 1830s, 40s, 50s and 60s to a level of 4 around 1870, and then has an even steeper trend during the 1870s and 1880s, increasing to a level between 6 and 7 from 1890 to 1910.

However, the full available Norwegian consumer prices (Grytten 2004a) have only been published in indexes and I have not found all the price information needed for constructing full consumption baskets. For this reason I create less ambitious food baskets, taking a step back to the pre-Allen method of comparing wages simply as expressed in grain (cf. Allen 2001: 419f). I look at grain, meat (beef) and butter to get a slightly more nuanced picture: for Norway prices for these products are available back to 1835 from the historical statistics of Statistics Norway (Statistisk Sentralbyrå 1978, table 278). I use Allen's sustainability quantities: 155 kilograms of grain, 5 kilos of beef, and 3 kilos of butter.[15] For Norway only oats is available back to 1835 so oats, which was cheaper than rye, barley or wheat, is used.[16] To use comparable groups for each country, I use agricultural workers. The wage data for Norway (Grytten 2007) are not differentiated per skill level while for Sweden and Denmark the data are for labourers, so I use the agricultural sector where it may be assumed that the workers were typically unskilled blue-collar labourers. For Denmark and Sweden the data are for male labourers; for Norway both sexes. Figure 5 shows real food wages for Sweden 1830–1910, Denmark 1815–75 and Norway 1835–1910.

[15] It is also possible to construct a more custom-made food price index, using potatoes, oat or rye, butter, pork and beef; all these prices are available for all three countries.

[16] Oats was typical bread-grain in Western Sweden, at least for the poorer classes (Utterström 1957: 880f), and likewise in Norway. It is then sensible to use for looking at working-class living standards. Due to the inclusion of Denmark in the comparison possibly wheat or rye should be used instead; SSB (1915) presents Norwegian prices back to 1836 also for wheat, rye and barley, and possibly these data could also be used.
Rönnbäck (2010) also uses oats for grain in the consumption basket. Khaustova and Sharp (2014) use rye bread, which of course is more expensive than grain itself.

Figure 5. Real food wages



Note. Agricultural worker wages in all countries (data Jörberg 1972, Grytten 2004, Khaustova and Sharp 2014). Swedish price data from Jörberg (1972) for beef and butter and Myrdal (1933: 200ff) for oats, Norwegian from Statistisk Sentralbyrå (1978, table 278), Danish from Hansen (1974, table15, pp. 273–6). Myrdal's oat prices used since Jörberg's are in litres, not kilograms. Norwegian prices are market prices in Oslo. For Sweden, an unweighted average of regional wages is used. Khaustova and Sharp (2014:7) use the assumption of 250 working days a year; so do I for Denmark and Sweden.

From this picture, it looks like Swedish real wages were trendless from 1830 to 1870.[17] Danish wages fluctuated much in the 1810s and 1820s, and then settled on a low level where they stagnated until 1875. Norwegian real wages stagnated from 1835 to the 1870s when they start a slight increase, which becomes much faster in the 1890s. The Danish levels are puzzling: given that Denmark was a more economically advanced country than its Scandinavian neighbours, we would expect real wages to be higher there, but according to these calculations they were actually significantly lower. This does not make sense; Rönnbäck (2010) finds that real wages at a low-paying Danish estate was at the level of average Swedish wages, and those of a high-paying Danish estate significantly higher than in Sweden. Or maybe the puzzle is why Norwegian wages are here higher than Danish and Swedish. I see two possible misleading characteristics of the data that could cause the Norwegian real wages

[17] Cf. Söderberg (2010: 464) who with a broader consumer price index (foodstuffs around 70 per cent, fuel, lighting and bulding materials around 10, clothing 10-15, "other" around 4 %) shows real wage stagnation for agricultural workers and Stockholm labourers c. 1820–1865 and then a rapid increase. Jörberg (1972: 335–6) sees a decrease in real wages for agricultural labourers 1820–40 and new increases during the economic boom of the 1850s. Jörberg (1972: 343) found – with his own cost of living index – an increase in the real wage of 11 per cent from 1820/34 to 1860/74 and then 73 per cent from 1860/74 to 1900/14.

to look much higher. One, the Norwegian data could be for a more skilled worker group. However, Grytten's (2007: 348) description of "hired labor on farms" does not sound like it. Two, the assumption of 250 working days in Denmark and Sweden could be too low, alternatively that Norwegian workers worked more days per year than their neighbours did. Grytten (2007: 345), who has constructed the Norwegian wage series, mentions that agricultural wage data in the archive are variously daily, weekly or annual. To translate into annual wages, he has used estimates of working time. For the early 19th century the assumption is around 3400 hours per year, and then a step-by-step decrease during the century so that mid-century it is about 3250 hours and 1900 ca 3000 hours (Grytten 2007: Figure 6.1). Given working days of say 12 hours (the 10-hour day typically spread in the late 19th century) this would translate into a decrease in working days from 283 at the beginning to 271 in the middle to 250 at the end of the century. But maybe it is more realistic to assume shortening of hours per day rather than decrease in days. Given that Khaustova and Sharp (2014), using a more complete consumer basket and the same wage data as used here, find increasing living standards for Danish labourers from about 1830 on, it could also be that prices on oats, beef and butter increased more than other items that workers consumed, so that my estimate of Danish worker living standards in Figure 6 is too pessimistic. Another factor that should be considered is that, as we have seen in section 3, the wage development for agricultural workers was much weaker in Denmark up to the 1870s compared to urban workers. The daily wage for rural worker is actually at the same level as that for an urban worker in the 1820s, but does not increase as strongly after that (Khaustova and Sharp 2014).

Overall, the look at food real wages in this section has strengthened the impression of section 3 that wages were rather stagnant between 1830 and 1870, and thereafter started a rapid increasing trend (cf. Allen 2009, Piketty 2014). However, that Norwegian real wages according to the data were higher than Danish and Swedish causes concern about data reliability at least for the levels, and merits further investigation.[18]

7. Conclusions

The most striking finding of the paper is the wage-GDP-disconnect in Norway from the 1840s to the 1870s, which then is switched to a period when wages grow faster than GDP. This stands in contrast to the earlier literature which has emphasized that no wage-GDP disconnect

[18] Gadd (2007) discusses whether wages were higher in Norway than in Sweden during the second half of the 19th century. He claims that nominal wages but also prices were higher. Thus he finds real wages (only using grain prices) at around parity from 1850 to 1900.

happened in Norway (Minde and Ramstad 1986, Myhre 1986) but does make sense in terms of our explanatory variables labour supply (population growth, then emigration) and labour militancy. Given this latter explanation, however, it is surprising *not* to find the same pattern in Sweden. We do find a positive wage-GDP-development there in the 1880s, which makes sense given the large-scale emigration of that decade, but this disappears in the 1890s and 1900s. The paper had five hypotheses:

- Hypothesis 1: wages will not keep up with GDP in the inflation of the 1840s and 1850s, but will not fall as much as nominal GDP during the deflation of the 1870s and 1880s
- Hypothesis 2: wages will lag behind GDP in Norway ca 1830s to 1860s and Sweden from the 1840s to 1870s
- Hypothesis 3: in Norway and Sweden in the 1880s and 1890s, wages increase faster than GDP
- Hypothesis 4a: possibly a wage offensive in Denmark in the 1850s, post-reform
- Hypothesis 4b: wage offensive in the 1880s in all three countries

The support for hypothesis 1 is mixed. For all Norwegian workers and Danish rural workers, wages do fall behind in the 1840s and 1850s, but in Sweden they don't. As for the 1870s and 1880s, the wage-GDP development in all three countries is positive, but on the other hand there was not as much deflation as might be expected given the stress on this factor in the previous literature (Eitrheim et al 2007: 395, Grytten 2009; also the international literature: Flinn 1974, Lindert 1985). As we have seen, a mid-century wage decoupling and a positive development after 1870 can also be expected given other factors, so I am a bit skeptical about the explanatory power of the monetary factor here.

Hypothesis 2, focusing on labour supply and proletarianization, finds support for Norway, with a remarkable wage-GDP disconnect between 1840 and 1870, which is not completely surprising, given the emphasis on proletarianization in some of the literature (Sejersted 1993). Other authors have focused more on inflation here (Grytten 2009), but again I am not so sure about that. Maybe more surprisingly, Denmark also shows a rift opening up between wage growth and GDP growth, at least for rural workers. There is also in the Danish literature discussion of poverty and proletarianization in this period (Hansen 1972, Hyldtoft 1999) but it is still somewhat surprising. It could possibly be that economic growth was led by other sectors so that rural workers' wages stagnated because their sector was stagnating, but Denmark is probably the least probable candidate for this explanation, as the Danish economy and Danish economic growth in the 19th century really was led by their highly efficient

agriculture. It is notable that Allen (2009) for Britain and Piketty (2014: 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, an "Engels' Pause" of stagnating working class living standards amidst economic growth. Conversely, wages seem to have lagged behind productivity not only in France and Britain in the 1840s and 1850s, but also in the US (Margo 2000) and, as we see here, Scandinavia. This strong correlation between countries with very different levels of development and general trajectories is surprising, but akin to that since 1980, wage shares have fallen not only in rich countries, as could be expected from a Neoclassical model given globalization and the growing availability of cheap labour globally, but also in the developing countries.

Hypothesis 3 is neatly confirmed for Norway but not so for Sweden where the 1870s and 1880s but not the 1890s shows a wage growth surplus to GDP growth. A more nuanced look at the data is needed to try to tease out the effects of price changes, emigration, and social factors.

Hypothesis 4a does not find support; actually, agricultural wages in Denmark after the reforms of 1848–51 perform very badly. They do rebound 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.

Hypothesis 4b does not find support: in Denmark, which like Norway and Sweden saw labour movement growth in this decade but unlike the neighbours did not see massive emigration to the US, the 1880s does not show wage growth above 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 in the Swedish case with Gustafsson's (1965) pessimistic conclusions on non-effects of unionism on wages in the saw mill industri 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).

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